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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

HAPAS Certificate
04/H092
Product Sheet 1

AGGREGATE INDUSTRIES THIN SURFACING SYSTEMS FOR HIGHWAYS

BARDON SMAPAVE 14 MM THIN SURFACING SYSTEM

This HAPAS Certificate Product Sheet(1) is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Assembly Government and the Department for Regional Development, 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 five years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to the Bardon Smapave 14 mm Thin Surfacing System, for use as a surface course on new and maintenance road construction.

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 macrotexture — the system complies with Performance Level 3(1) and is satisfactory for use on roads with posted speed limits greater than 50 mph (see section 6).

Wheel tracking — the system complies with Performance Level 3 and is suitable for sites requiring high rut resistance(1) (see section 7).

Sensitivity to water — the system can achieve greater than 80% retained stiffness (see section 8).

Bond to substrate — the system can achieve greater than 400 kPa (see section 9).

Noise — the measured road surface influence indicates the system will generate less road noise than a hot-rolled asphalt surface with 2 mm surface macrotexture (see section 10).

Durability — the system will provide a durable surface course (see section 12).

(1) As defined in Appendix B of the *Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways.*

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

Date of First issue: 30 July 2012

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 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, the Bardon Smapave 14 mm Thin Surfacing System, if used in accordance with the provisions of this Certificate, will comply with the following requirements of the BBA HAPAS *Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways*:

- Table B.1 Wheel tracking Performance Level 3
- Table B.2 Surface macrotexture depth levels Performance Level 3
- Table B.4 Two-year performance trial
- Table B.5 Torque bond strength
- Table B.6 Sensitivity to water.

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: 3 *Delivery and site handling* (3.1 and 3.2) of this Certificate.

Technical Specification

1 Description

1.1 The Bardon Smapave 14 mm Thin Surfacing System is a bituminous surface course consisting of a paving grade bitumen to BS EN 12591 : 2009 or a proprietary polymer-modified bitumen, cellulose fibres, limestone filler and fine and coarse aggregates to BS EN 13043 : 2002.

1.2 The system is used in conjunction with a hot-applied, proprietary, polymer-modified bond coat.

1.3 Ancillary items used with the system include:

- joint preparation — hot-applied 40/60 or 50/70 penetration bitumen to BS EN 12591 : 2009, a proprietary, cold, thixotropic bitumen emulsion, or a proprietary, hot-applied, elastomeric polymer-modified bond coat with a minimum residual bitumen content of 65%, for use on all cut joints
- tack coat — C40 B 4 (K1-40) bitumen emulsion tack coat conforming to BS EN 13808 : 2005 for use on small areas not accessible by machine application.

2 Manufacture

2.1 The system is manufactured using conventional asphalt production methods.

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 Aggregate Industries UK Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM 96927).

3 Delivery and site handling

3.1 Bond and tack coats may be delivered to site either in bulk by tanker or in 205 litre drums.

3.2 The system is not classified under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009* (CHIP4)/*Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation) 2009*.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Bardon Smapave 14 mm Thin Surfacing System.

Design Considerations

4 General

4.1 The Bardon Smapave 14 mm Thin Surfacing System is satisfactory for use as a thin surfacing system on bituminous or concrete substrates provided they are stable and have sufficient loadbearing strength to support the loads imposed during installation and service.

4.2 Guidance on evaluating the condition of an existing surface is provided in DMRB[1], HD 30/08, 7.3.3.

4.3 Guidance on appropriate surfacing selection is provided in the DMRB, HD 36/06, 7.5.1. Local Authorities may have different criteria which should be taken into consideration.

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

5 Practicability of installation

The system is installed only by contractors approved by the Certificate holder using conventional paving equipment (see the *Installation* section).

6 Surface macrotexture

The system can achieve a mean initial surface macrotexture of greater than 1.3 mm and retained surface macrotexture depth levels of at least 0.9 mm. This complies with Performance Level 3 of Table B.2 of the Guidelines Document and is suitable for roads with posted speed limits greater than 50 mph (see section 18, Table 1).

7 Wheel tracking

Resistance to permanent deformation complies with Performance Level 3 of Table B.1 of the Guidelines Document and is suitable for sites requiring a high rut resistance (see section 18, Table 1).

8 Sensitivity to water

The retained stiffness ($ITSM_{c3}$) for the system measured greater than 80% and complies with the minimum requirements of Table B.6 of the Guidelines Document (see section 18, Table 1).

9 Bond to substrate

The torque bond strength for the system measured greater than 400 kPa and meets the minimum requirement of Table B.5 of the Guidelines Document (see section 18, Table 1).

10 Noise

10.1 The road surface influence (RSI_H) has been recorded lower than the theoretical hot-rolled asphalt surface with 2 mm macrotexture depth in accordance with Table 2 of the Guidelines Document (see section 18, Table 2).

10.2 Road traffic noise levels will be affected by several factors, including location, traffic type, and the condition of the existing road, and therefore the RSI_H value found may not be reproduced on other installations.

11 Maintenance

The system is not subject to any routine maintenance requirements; however, any damage must be repaired (see section 17).

12 Durability

When installed in accordance with this Certificate the system will provide a durable surface course for new and maintenance road construction on sites with posted speed limits greater than 50 mph and requiring high rut resistance.

Installation

13 General

13.1 The Bardon Smapave 14 mm Thin Surfacing System is installed in accordance with the Certificate holder's installation procedures incorporating the guidance provided in BS 594987 : 2010.

13.2 The system can be applied to bituminous or concrete substrates at a nominal thickness layer of between 35 mm and 50 mm in depth. The minimum thickness at any point must not fall below 30 mm.

13.3 Provided the substrate is free from standing water or ice and the minimum rolling temperature can be achieved, the system can be installed at a minimum ambient temperature of –1°C, measured on a rising thermometer with a light wind.

13.4 Wind speed is measured and a decision on whether to proceed with the installation determined in accordance with MCHW, Vol 1, SHW *Series 900*, Figure 9/1.

14 Substrate preparation

14.1 The substrate must be prepared prior to application of the system as follows:

- remedial work identified and repaired
- swept clean of dirt and other debris
- ironworks raised to their appropriate finished levels.

14.2 Application of a polymer-modified bitumen emulsion bond coat should be at the following rates of spread:

- 0.35 l·m^{-2} to 0.60 l·m^{-2} on new and clean surfaces
- 0.55 l·m^{-2} to 0.85 l·m^{-2} on planed or overlay surfaces.

14.3 For small areas and detailing C40 B 4 (K1-40) bitumen emulsion tack coat must be applied leaving a uniform coating, using appropriate hand-held equipment.

15 Laying and compaction procedures

15.1 Machine or hand installation must follow the requirements of BS 594987 : 2010, Sections 6.3, 6.4 and 6.7.

15.2 Compaction must follow the general requirements of BS 594987 : 2010, Sections 9.2 and 9.3.

15.3 Rolling and compaction must be undertaken immediately after the material has emerged from the paving machine and above the minimum rolling temperature of 120°C.

15.4 During compaction the first pass must be over the longitudinal joint.

16 Joints

Cold joints or damaged warm joints must be sawn back to a vertical edge, cleaned and painted with a thick uniform coating of joint preparation identified in section 1.3, in accordance with the Certificate holder's installation procedures.

17 Repair

Any damaged area must be cut back to sound material by planing or other suitable means and replaced with a material appropriate for the location, traffic and area of reinstatement. Materials must be selected in agreement with the Certificate holder and the purchaser.

Technical Investigations

18 Tests

Mandatory laboratory and road tests

18.1 A series of tests was carried out on trial installations in accordance with the Guidelines Document. A summary of the tests and the requirements is at Tables 1 and 2.

Table 1 Performance Levels achieved

Test parameter	Requirement	Performance Level achieved	Method
Initial surface macrotexture (mm)	≥1.30	3	BS EN 13036-1
Retained surface macrotexture (mm)	≥0.9	3	BS EN 13036-1
Rut rate (mean/max individual) (mm·h^{-1})	≤5.0/≤7.5	3	BS 598-110
Rut depth (mean/max individual) (mm)	≤7.0/≤10.5	3	BS 598-110
Retained stiffness (ITSM$_{c3}$) (%)	≥80	Complies	Guidelines Document, Appendix A.2
Torque bond strength (kPa)	≥400	Complies	Guidelines Document, Appendix A.3
Two year visual inspection	>G	Complies	Guidelines Document, Appendix A.10

Optional tests

18.2 A test was carried out to confirm the performance of the system in relation to noise. The results of the test are given in Table 2.

Table 2 Performance in relation to noise

Test parameter	Measured value	Method
Noise RSI$_H$ [dB(A)][1]	−2.8[2]	Statistical pass-by method, Appendix A.8, Guidelines Document
Age of site when tested (months)	11	

(1) The minimum speed road surface influence (RSI$_H$) is a measure of the difference in noise that could be expected if compared against a theoretical hot-rolled asphalt surface with 2 mm surface macrotexture. A negative result indicates a reduction in noise level. Road traffic noise levels will be affected by several factors such as location, age and condition of the existing road and traffic type.

(2) Mean result of two measurements, −3.0 and −2.6.

19 Investigations

19.1 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. Results from the installation confirmed that it complied with the contractual requirements.

19.2 A user/specifier survey relating to existing sites that were at least two years old was carried out to confirm the system's performance in use.

19.3 The manufacturing process was examined by inspection of a typical coating plant, including the methods adopted for quality control, and details were confirmed of the quality and composition of materials used. The inspection confirmed that the plant operated in accordance with the requirements of the Quality Plan and Quality System agreed with the BBA.

19.4 Data gathered from an installation trial leading to HA type approval show that when laid at a nominal thickness of 30 mm on a road of Stress Level 1(1) and estimated Traffic Level of 1770 cv/l/d(2), the system will meet the Performance Level 3(3) requirement for initial and retained surface macrotexture (see Table 1). The initial texture measured was 2.1 mm.

(1) Site Stress Levels are defined in Appendix C of the Guidelines Document.

(2) Traffic Levels (cv/l/d) are defined as commercial vehicles/lane/day.

(3) Performance Levels are defined in Appendix B of the Guidelines Document.

19.5 Additional data relating to surface macrotexture depth were supplied indicating that texture depths less than 1.8 mm can be achieved prior to trafficking.

Bibliography

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*

BS 594987 : 2010 *Asphalt for roads and other paved areas — Specification for transport, laying and compaction and type testing protocols*

BS EN 12591 : 2009 *Bitumen and bituminous binders — Specifications for paving grade bitumens*

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 13043 : 2002 *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*

BS EN 13808 : 2005 *Bitumen and bituminous binders — Framework for specifying cationic bituminous emulsions*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways, March 2011

HD 30/08 *Design Manual for Roads and Bridges : Volume 7, Pavement Design and Maintenance : Section 3, Pavement Maintenance Assessment : Part 3, Maintenance Assessment Procedure*

HD 36/06 *Design Manual for Roads and Bridges : Volume 7, Pavement Design and Maintenance : Section 5, Pavement Materials : Part 1, Surfacing Materials for New and Maintenance Construction*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*, Series 900 *Road pavements — bituminous bound materials*
Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*, Series 900 *Road pavements — bituminous bound materials*

20 Conditions

20.1 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.

20.2 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.

20.3 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.

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

20.5 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.

20.6 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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