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2 The Building Standards (Scotland) Regulations 1990 (as amended)



In the opinion of the BBA, Hardicrete Heavy Duty Surfacing, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials and workmanship
Standards:	B2.1 and B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product complies with these Standards. See sections 11.1 to 11.3 and section 12 of this Certificate.
Regulation:	13	Means of escape from fire, facilities for fire-fighting and means of warning of fire
Standard:	E10.1	Facilities for fire fighting — Access
Comment:		The product is capable of satisfying this Standard.
Regulation:	29	Access and facilities for dwellings
Standards:	Q2.1 to Q2.4	Access — Access to dwellings
Comment:		The product is capable of satisfying these Standards.
Regulation:	30	Solid waste storage
Standard:	R2.1	Solid waste storage — Buildings of purpose group 1
Comment:		The product can satisfy the roadway access requirements of this Standard.

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Hardicrete Heavy Duty Surfacing, if used in accordance with the provisions of this Certificate, will satisfy the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See sections 11.1 to 11.3 and section 12 of this Certificate.
Regulation:	E6(2)	Facilities and access for the Fire Brigade
Comment:		The product is capable of satisfying this Regulation.

4 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.

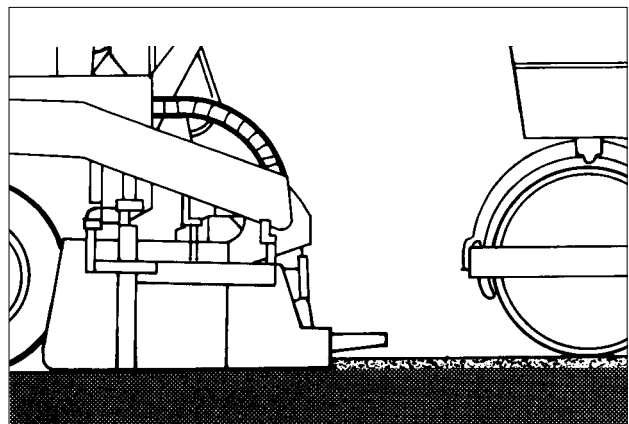
See sections: *5 Description (5.2), and 6 Delivery and site handling (6.3).*

Technical Specification

5 Description

5.1 Hardicrete Heavy Duty Surfacing comprises an open-textured, bituminous receiving course with a controlled proportion of voids, fully grouted with a polymer-modified cement grout. Hardicrete can be used for new construction or laid over an existing surface (see Figure 1).

Figure 1 Application of receiving course



5.2 The receiving course comprises hot penetration grade bitumen and graded aggregates.

5.3 The Hardicrete grout comprises Portland cement, redispersible polymer powder, fine mineral aggregate and water; optional plasticising and anti-foaming agents, may also be included.

5.4 Standard techniques are used in the manufacture of the open-textured bituminous receiving course. The aggregate is graded to give a controlled proportion of air voids to accommodate the polymer-modified cement grout.

5.5 Quality control checks are carried out on the raw materials and on the composition of the finished receiving course.

6 Delivery and site handling

6.1 The receiving course material is delivered to site in bulk for immediate use and laid as stipulated in BS 4987-1 : 2001 and BS 4987-2 : 2001.

6.2 The ingredients for the grout are normally delivered to site on a mobile grout production/ laying unit which has a bulk storage tank, and dry storage area.

6.3 The cement, filler and sand components are either delivered in premixed 750 kg bulk bags or the correctly proportioned individual components are supplied on pallets in 25 kg paper sacks. The redispersible polymer powder is supplied in 20 kg paper sacks with polyethylene liners and should be stored in a dry location at temperatures below 25°C.

6.4 Normal storage procedures for the cement and fillers should be observed.

Design Data

7 General

7.1 Hardicrete Heavy Duty Surfacing is a jointless, flexible, chemically-resistant surfacing for heavy-duty pavements, will resist the fluids present in vehicle and aircraft maintenance areas and can accommodate limited movement of an unstable base. It is able to sustain the abrasion and loading caused by industrial traffic (including steel-wheeled and tracked vehicles), heavy commercial vehicles, public service vehicles or aircraft, in such locations as warehouses, cargo handling areas, bus depots and airfields (runways, hard standings and maintenance areas).

7.2 Hardicrete is satisfactory for use as a heavy-duty industrial surfacing (new or remedial) assuming that the base has sufficient structural strength to withstand the imposed loadings, and that maximum grout penetration has been achieved. It can be used:

(a) directly over new bitumen macadam, hot-rolled asphalt, lean or pavement quality concrete, in accordance with normal construction

practice, eg Design Manual for Roads and Bridges, Volume 7, Section 2, Part 3 HD 26/01 *Pavement design*

(b) directly over existing sound, level concrete or asphalt

(c) with a regulating layer, over an existing irregular concrete or asphalt base.

8 Curing

8.1 The curing time of the grout varies with atmospheric conditions, but the minimum periods to be allowed before use by the following traffic, should be:

pedestrians	12 hours
cars	1 day
lorries, standing loads, possibility of oil spillage	7 days ⁽¹⁾

(1) A rapid curing specification is also available but is not covered by this Certificate.

8.2 Where exceptional loads (eg point loading from trailer jockey wheels or stands) or chemical spillage are expected, longer curing periods may be necessary. The Certificate holder's advice should be sought in these cases.

9 Maintenance

Where conditions are very severe (eg areas where steel-wheeled or tracked vehicles regularly turn or reverse) localised damage may take place. This should be repaired promptly by patching, under the guidance of the Certificate holder.

10 Flexibility

A Hardicrete surface requires no expansion joints and can accommodate the minor movement of a base in flexible construction. Where it is laid over an existing concrete surface, the joints may be retained in the new surface, to remove the possibility of reflective cracking.

11 Chemical resistance



11.1 The chemical resistance of Hardicrete is similar to concrete.

11.2 Hardicrete is particularly appropriate for vehicle (including aircraft) maintenance areas, where there is the possibility of spillage of fuel, oil and hydraulic fluids.

11.3 Where abnormal chemical spillage is expected, the advice of the Certificate holder should be sought.

12 Durability



Hardicrete has a much greater resistance to permanent deformation, mechanical damage, and to attack by fuel and oils than asphalt, and will have a life well in excess of asphalt in those conditions.

13 Sub-base construction

13.1 The Hardicrete receiving course should be laid directly onto existing clean, sound, firm and acceptably level concrete or asphalt surfaces. An intermediate regulating layer of asphalt is required over an irregular base.

13.2 The design for construction should be in accordance with accepted techniques, eg those stipulated in the Design Manual for Roads and Bridges, Volume 7, Section 2, Part 3 HD 26/01 *Pavement design*.

14 Regulating course

The regulating course consists of hot-rolled asphalt or dense bitumen macadam and is used as an intermediate layer to prepare an irregular base to the requirements of the installation company in readiness for the application of the receiving course.

15 Mixing of grout

The grout is prepared on site from fixed proportions of water, cement, binder and fillers, using a combined mixer/pump unit at the rear of the mobile grout production/laying unit. Optional plasticising and anti-foaming agents may be added. The mixed grout is discharged directly at the point of application. Care is taken to prevent settlement of the fine aggregates.

16 Application

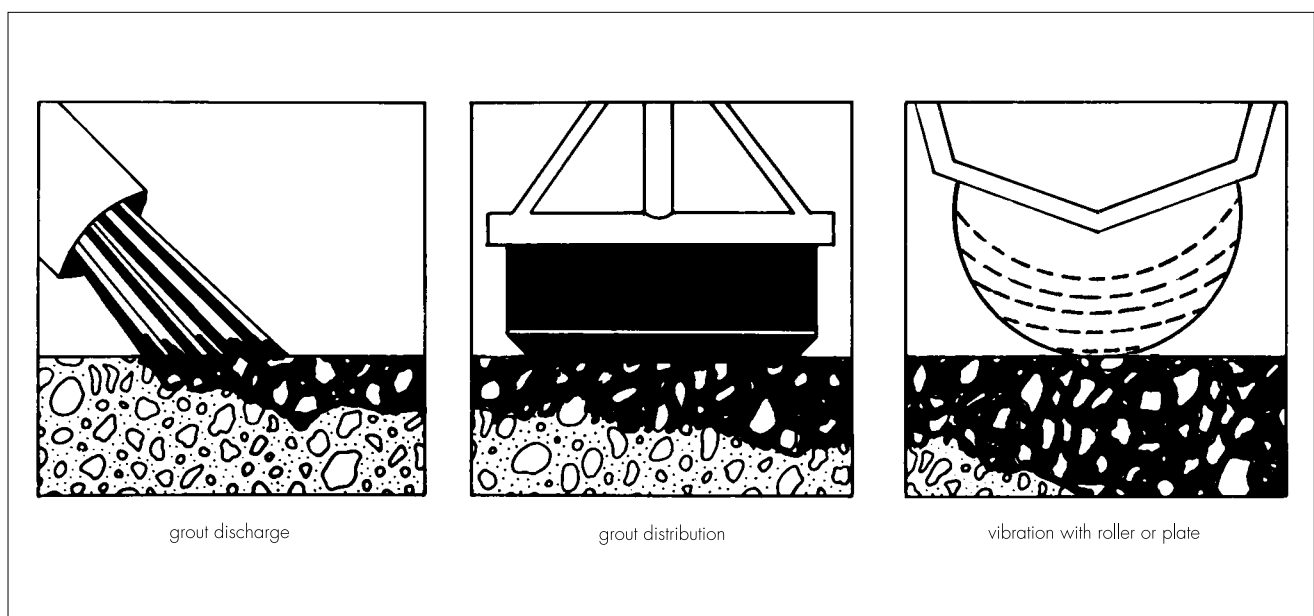
16.1 The product is applied only by operatives from the Certificate holder.

16.2 The receiving course is applied and compacted by traditional surfacing techniques (see Figure 1).

16.3 The grout is applied after the receiving course has cooled to below 40°C. The receiving course must not be opened to traffic before the grout is applied and cured, and any areas accidentally damaged or contaminated must be removed and replaced.

16.4 If grouting cannot be completed within a working day, the area to be treated is divided into strips up to 10 m wide and the edges are masked. The grout is pumped from the mixer, discharged onto the receiving coat, spread with brooms and squeegees, and vibrated into the voids with a vibrating roller or plate within 30 minutes of discharge (see Figure 2). The receiving course is deemed to be fully penetrated when, following vibration, no further grout can be forced into the voids and surplus liquid remains on the surface. Any excess grout is removed by sweeping and the final finish is normally achieved using either a powered brush or hand brooms. Cores are taken regularly after initial set (approximately one week) to confirm the satisfactory integration of the grout into the receiving course.

Figure 2 Application of grout



Technical Investigations

The following is a summary of the technical investigations carried out on Hardicrete Heavy Duty Surfacing.

17 Tests and investigations

The following tests and investigations were carried out as part of the assessments which led to the issue of previous Certificates Nos 83/1101 and 79/661.

- (1) Tests were carried out to determine:
chemical resistance to acids, alkalis, solvents and oils
freeze/thaw resistance.
- (2) Data from an investigation conducted at Nottingham University were assessed. These data related to:
resistance to penetration
compressive strength
stiffness modulus
Poisson's ratio
fatigue characteristics
permanent deformation
deflection measurements
resistance to wheel loading
effect of high temperatures
requirements of sub-grade
pavement design
- (3) Visits were made to established sites to investigate performance in use under the conditions described in this Certificate.
- (4) Visits were made to sites in progress to assess the practicability of application, and to compare application techniques.

18 Other investigations

The following investigations were carried out as part of the assessment leading to the issue of this Certificate.

(1) A re-examination was made of the data and investigations on which the previous Certificates were based. The conclusions drawn from the original data remain valid.

(2) A visit to a site in progress was made to reassess the penetration of the grout and practicability of application.

(3) A user survey was conducted to evaluate the product's performance in use.

(4) A factory visit was made to establish methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Additional Information

The management systems of Miles Macadam Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9002 : 1994 by ISOQAR (Certificate No 1140/96).

Bibliography

BS 4987-1 : 2001 *Coated macadam (asphalt concrete) for roads and other paved areas – Specification for constituent materials and for mixtures*

BS 4987-2 : 2001 *Coated macadam (asphalt concrete) for roads and other paved areas – Specification for transport, laying and compaction*

BS EN ISO 9002 : 1994 *Quality systems – Model for quality assurance in production, installation and servicing*

Design Manual for Roads and Bridges : Volume 7,
Pavement Design and Maintenance : Section 2
Pavement design and construction : Part 3
HD 26/01 *Pavement design*

Conditions of Certification

19 Conditions

19.1 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.

19.2 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.

19.3 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; and

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

19.4 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.

19.5 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.



In the opinion of the British Board of Agrément, Hardicrete Heavy Duty Surfacing is fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

Certificate No 88/1969 is accordingly awarded to Miles Macadam Ltd.

On behalf of the British Board of Agrément

Date of Third issue: 18th March 2003

Chief Executive

**Original Certificate issued on 8th January 1988. This amended version issued to include a change of company name, changes to product description, references to revised Building Regulations, British Standard and inclusion of CDM Regulations and new Conditions of Certification.*

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British Board of Agrément

P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD25 9BA
Fax: 01923 665301

©2003

e-mail: mail@bba.star.co.uk
website: www.bbacerfs.co.uk



For technical or additional information,
contact the Certificate holder (see
front page).
For information about the Agrément
Certificate, including validity and
scope, tel: Hotline 01923 665400,
or check the BBA website.