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HAPAS
Roads and Bridges Agrément Certificate No 06/H123

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

IRONMASTER IRONWORK REINSTATEMENT 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 IRONMASTER[1] IRONWORK REINSTATEMENT SYSTEM, USED FOR THE REINSTATEMENT OF MANHOLE FRAMES AND IRONWORK WHERE RAPID TRAFFICKING IS REQUIRED.*
- *The system comprises fast-setting, resin-based bedding mortar, a cementitious infill material and a hot-applied, polymer-modified wearing surface incorporating a nominal 2 mm to 5 mm anti-slip aggregate.*
- *The system is for use with a cover and frame up to and including Class D400 of BS EN 124 : 1994.*
- *The system is installed by the Certificate holder.*

(1) Registered trademark of the Certificate holder.

HAPAS Requirements

1 Requirements

1.1 The Highways Technical Advisory Committee (HiTAC) of HAPAS has agreed relevant assessment criteria for the system with the BBA.

1.2 In the opinion of the BBA, the system, when manufactured and laid in accordance with the provisions of this Certificate, will meet the relevant requirements. See section 5 of this Certificate.

Regulations

2 Construction (Design and Management) Regulations (England and Wales) 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 section: 4 *Delivery and site handling* (4.1 and 4.3) of this Certificate.

Technical Specification

3 Description

3.1 The Ironmaster Ironwork Reinstatement System consists of the following components:

- Ironmaster Mortar P (summer and winter grade) — two-component, fast-setting, polyester resin-based mortars to bed and level manhole frames
- Ironmaster Infill Mortar — a two-part, fast-setting cementitious concrete, used for backfilling around manhole installations
- Ironmaster Shims — precast, reinforced concrete shims for packing and levelling manhole frames
- Ironmaster Patch — a hot-applied, polymer-modified bitumen wearing surface, incorporating a nominal 2 mm to 5 mm aggregate.

3.2 Quality control checks are carried out on the raw materials during manufacture and on the finished products.

4 Delivery and site handling

4.1 The system components are delivered to site in packaging and weights given in Table 1. The tub and bags bear the manufacturer's name, address, mixing instructions and a hazard label in accordance with the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3) (see Table 2).

4.2 When handling Ironmaster Infill Mortar on site, the normal health and safety procedures associated with cementitious materials should be observed.

4.3 Ironmaster Patch is not classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3). Standard material safety data sheets for hot asphalts apply.

Table 1 Packaging and weights

Component	Pack size (kg)	Packaging	Yield (litres)	Shelf-life (months)
Ironmaster Mortar P	25	Tub	12.5	6
Ironmaster Infill Mortar	25	Bag or tub	12.0	6
Ironmaster Patch	25	Bag	12.0	12

Table 2 Hazard classification

Ironmaster Mortar P	Flashpoint (°C)	Hazard classification
Accelerator	above SADT[1]	Irritant, Oxidising agent
Resin	32	Harmful, Flammable
Ironmaster Infill Mortar	N/A	Irritant
Ironmaster Patch	>200	None[2]

(1) Self Accelerated Decomposition Temperature (SADT) = 70°C

(2) Not considered hazardous at ambient temperatures. Standard health and safety data sheets apply for the use of hot asphalts. Contact with hot material and the inhalation of fumes should be avoided.

4.4 Health and Safety Data Sheets and the Control of Substances Hazardous to Heath Regulations 2002 (COSHH) risk assessments for the works should be available to the purchaser and be maintained on site.

Design Data

5 General

5.1 The Ironmaster Ironwork Reinstatement System is for use with a cover and frame up to and including Class D400 of BS EN 124 :1994.

5.2 Precast concrete inspection chambers should comply with the requirements of BS 5911-4 : 2002 and BS EN 752-3 : 1997.

5.3 The system's compressive strength and rapid setting characteristics are adversely affected by low temperatures and should not be used when the road or air temperature is below 5°C.

5.4 When installed in accordance with this Certificate, Ironmaster Mortar P can achieve 30 Nmm^{-2} compressive strength in one hour and is suitable for rapid construction as defined in HD 27/04, Clause 3.11 and is also suitable for use as a bedding material in accordance with HA 104/02, Clause 6.1.

5.5 The various components of the system should be installed to comply with the thickness limits given in Table 3.

Table 3 Minimum and maximum material thickness

Component	Thickness (mm)	
	Minimum	Maximum
Ironmaster Mortar P	5	50
Ironmaster Infill Mortar	20	200

5.6 Ironmaster Patch is applied at a nominal 30 mm thickness in accordance with sections 9.12

and 9.15 of this Certificate and ensuring that any requirements for maximum depressions/crowning that apply are complied with.

5.7 Specifiers of the system must ensure that the resistance to permanent deformation of the Ironmaster Patch component is satisfactory to accept the expected loadings due to traffic, (see Table 4 for Ironmaster Patch characteristics).

Table 4 Ironmaster Patch characteristics

Test	Method	Result
Wheel tracking at 50°C	BS 598-110	
rate (mm/hr)		6.3[1]
rut depth (mm)		10.3[1]
Skid Resistance Valve (SRV)		
before wheel tracking		99
after wheel tracking		88

(1) Mean of three sets of tests on 50 mm thick specimens.

5.8 Should other materials be used in conjunction with the system (for example to repair/rebuild the supporting structure) such materials should have a strength commensurate with the reinstatement system.

5.9 Alignment of the frame and cover should be such to ensure safe access to the manhole.

6 Durability

6.1 The results of tests and assessments indicate that provided the surrounding pavement remains structurally sound, the system will have a service life greater than three years.

6.2 Monitoring of reinstatements by visual inspection should be carried out during routine inspections of the road network to ensure that there is no appreciable loss of texture and that investigatory levels for depressions/crowning have not been breached.

Installation

7 General

7.1 The installation of the Ironmaster Ironwork Reinstatement System must be carried out by experienced specialist contractors. It is essential to adhere strictly to the procedures described in this Certificate and the manufacturer's installation method statement.

7.2 The supporting structure must be of adequate size and strength to support the frame, cover and expected loading.

8 Preparation

8.1 A rectangular area, indicating the minimum width needed for excavation, is marked out around the existing frame of a failed manhole. The width from the edge of the ironwork to the edge of the repair shall be between 100 mm and 750 mm.

8.2 The marked area is saw cut and excavated to uncover the flange of the existing manhole cover frame. The existing cover and frame are removed, if necessary using a suitable mechanical lifting device, taking care to avoid dropping loose materials into the shaft.

8.3 All old bedding mortar should be removed and the supporting structure cut back or loose bricks removed until a sound and level base is achieved (see Figure 1).

Figure 1 Prepared excavation

8.4 The newly exposed substrate should be clean and structurally sound prior to commencing the reinstatement work. Loose debris can be removed using hot compressed air.

8.5 Should the chamber show any signs of structural failure, the client should be informed prior to continuing the reinstatement work.

8.6 The finishing course of the supporting structure should be adjusted accordingly. For brick structures levelling should be achieved prior to the installation of the final course.

8.7 Concrete structures should be repaired using conventional concrete repair techniques and materials. The Certificate holder can advise on suitable materials.

9 Installation

Bedding

9.1 The depth needed to install the manhole frame and cover level to the road surface should be determined, taking into account the depth of the manhole frame and the manufacturer's recommended maximum and minimum thicknesses, (see Table 3).

9.2 Ironmaster Mortar P should be prepared by slowly adding the filler to the resin in the ratio of one complete tin of resin to one pack of

filler/activator and mechanically mixed until a homogeneous mix is obtained. Part tins or packs should not be mixed.

9.3 Depending on the depth of ironwork and excavation, the use of 30 mm or 50 mm thick reinforced precast concrete shims, compatible with the bedding mortar, can be used for raising the ironwork to the correct level. If shims are used then the bedding mortar must also be used at each interface.

9.4 The mortar should be immediately placed on the supporting structure, allowing a 5 mm excess thickness and used within 10 minutes of mixing.

9.5 The frame is lowered into position and placed on the bedding mortar to ensure it is fully supported and checking the frame does not overhang the mortar at any point (see Figure 2). Care should be taken to avoid voids in the bedding material under the frame, particularly in the vicinity of the cover seating.

Figure 2 Frame bedded on Ironmaster Mortar P

9.6 The frame is tamped down into place, ensuring the correct level is obtained. This can be checked by placing a straight edge over the frame and surrounding surface.

9.7 Any holes within the frame should be in-filled and the flanges of the frame enveloped by a minimum thickness of 10 mm of the bedding material.

9.8 Exposed surfaces of the bedding material around the frame must be float finished, ensuring any voids or loose material is removed and the inside surface pointed to a smooth finish.

Backfill

9.9 Once the bedding mortar has achieved sufficient strength the reinstatement is backfilled using Ironmaster Infill Mortar.

9.10 Ironmaster Infill is prepared by adding the bag of accelerator (special cement), to the sand/aggregate, and mechanically mixing with water until a uniform consistency is achieved. The volume of water required will vary depending on the moisture content of the aggregate. Typically, two litres of water will achieve the required workability.

9.11 The area to be in-filled should be wetted and the mortar placed within 10 minutes of mixing to 30 mm below the required surface fill level, and compacted ensuring no voids are evident. The final surface is then rough floated to achieve a level surface (see Figure 3).

Surface reinstatement

9.12 Once the infill mortar has sufficiently cured, (minimum 15 minutes), the reinstatement is thoroughly cleaned with hot compressed air, paying particular attention to the vertical joints of the surrounding asphalt.

9.13 The surface is then reinstated using Ironmaster patch, a hot-applied, polymer-modified bitumen compound.

9.14 The Ironmaster Patch compound is heated to between 130°C and 200°C and hand screeded into the prepared area to finish flat and flush with the surrounding adjacent surfaces, ensuring that there are no significant depressions or crowning in the surface (see Figure 4).

9.15 Whilst the Ironmaster Patch compound is still molten, a covering of a nominal 2 mm to 5 mm dry aggregate, with a PSV of >60 is applied to produce a skid-resistant wearing course (see Figure 5).

9.16 After allowing a minimum period of one hour to permit the components to develop adequate strength, the site is cleaned and opened to traffic.

Figure 3 Ironmaster infill applied

Figure 4 Surface reinstated with Ironmaster Patch

Figure 5 Anti-slip aggregate applied

Technical Investigations

The following is a summary of technical investigations carried out on the Ironmaster Ironwork Reinstatement System.

10 Tests

Tests were carried out on the following components to determine:

Ironmaster Mortar P
- shrinkage
- accelerated ageing
- pot life

Ironmaster Infill Mortar
- freeze/thaw resistance
- shrinkage
- pot life.

11 Investigations

11.1 An examination was made of independent test data relating to components of the system including:

Ironmaster Mortar P
- flexural strength
- compressive strength

Ironmaster Infill Mortar
- compressive strength
- chloride content

Ironmaster Patch
- resistance to rutting
- skid resistance
- adhesion to Ironmaster Infill Mortar
- adhesion to steel.

11.2 An examination was made of independent test data relating to full-scale load tests to BS EN 124 : 1994

11.3 A postal user survey was conducted to investigate the performance of the product in service. The information received from the survey confirmed that installations on minor and major roads continue to perform satisfactorily after three years in service.

11.4 A visit was made to a site to witness the installation of the system.

11.5 The manufacturing processes were examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Additional Information

The management systems of the manufacturer's of the components of the Ironmaster Ironwork Reinstatement System have been assessed and registered as meeting the requirements of ISO 9001 : 2000.

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 5911-4 : 2002 *Precast concrete pipes and ancillary concrete products — Specification for unreinforced and reinforced concrete inspection chambers*

BS EN 124 : 1994 *Gully tops and manhole tops for vehicular and pedestrian areas. Design requirements, type testing, marking, quality control*

BS EN 752-3 : 1997 *Drain and sewer systems outside buildings — Planning*

ISO 9001 : 2000 *Quality management systems — Requirements*

HA 104/02 *Design Manual for Roads and Bridges : Volume 4, Geotechnics and Drainage : Section 2, Drainage : Part 5, Chamber Tops and Gully Tops for Road Drainage and Services — Installation and Maintenance*

HD 27/04 *Design Manual for Roads and Bridges : Volume 7, Pavement Design and Maintenance : Section 2, Pavement Design and Construction : Part 4, Pavement Construction Methods*

Conditions of Certification

12 Conditions

12.1 This Certificate:

(a) relates only to the product that is named, 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) is valid only within the UK;

(d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(e) is copyright of the BBA;

(f) is subject to English law.

12.2 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, are references to such publication in the form in which it was current at the date of this Certificate.

12.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabrication including all related and relevant processes 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 as and when deemed appropriate by the BBA under arrangements that it will determine;

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

(d) remain in accordance with the requirements of the Highway Authorities' Product Approval Scheme.

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

(a) the presence or absence of any patent, intellectual property 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 actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

12.5 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.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, the Ironmaster Ironwork Reinstatement System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 06/H123 is accordingly awarded to Rhino Asphalt Solutions Ltd.

On behalf of the British Board of Agrément

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Chief Executive

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