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HAPAS Certificate
06/H123
Product Sheet 1

RHINO ASPHALT SOLUTIONS

IRONMASTER IRONWORK REINSTATEMENT SYSTEM

This HAPAS Certificate Product Sheet(1) is issued by the British Board of Agrément (BBA), supported by National Highways (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government and the Department for Infrastructure, 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 three years.
(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to the Ironmaster(1) Ironwork Reinstatement System, used for the reinstatement of manhole frames and ironwork up to and including Group 4 of BS EN 124-1 : 2015.
(1) Ironmaster is a registered trademark.

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 three-yearly review.

KEY FACTORS ASSESSED

Performance — the system, when used as a bedding mortar, satisfies the requirements for compressive strength in accordance with the MCHW, Volume 1, Series 500, Clause 507 Chambers, 44. Ironmaster Mortar P satisfies the compressive strength requirements for a rapid-setting bedding material in accordance with the MCHW, Volume 1, Series 500, Clause 507 Chambers, 24 (iii). Ironmaster Mortar C satisfies the requirements of the MCHW, Volume 1, Series 500, Clause 507 Chambers, 24 (i) to (iv) (see section 6).

Durability — provided the surrounding pavement remains structurally sound, the system will have an anticipated service in excess of five years (see section 8).

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 Fourth issue: 30 November 2022

Originally certificated on 19 May 2006

Hardy Giesler
Chief Executive Officer

Requirements

In the opinion of the BBA, the Ironmaster Ironwork Reinstatement System, when manufactured and installed in accordance with the provisions of this Certificate, is satisfactory as an ironwork reinstatement system. The system meets the relevant requirements for bedding mortars of the *Manual of Contract Documents for Highway Works* (MCHW)(1) Volume 1 *Specification for Highway Works* (SHW), Series 500, Clause 507 Chambers, 44, and meets the relevant for bedding materials of the MCHW, Volume 1 SHW, Series 500, Clause 507 Chambers, 24.

(1) The MCHW is operated by the Overseeing Organisations: National Highways, Transport Scotland, the Welsh Government and the Department for Infrastructure (Northern Ireland).

Regulations

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* of this Certificate,

Technical Specification

1 Description

The Ironmaster Ironwork Reinstatement System comprises:

- Ironmaster Mortar P (summer and winter grades) — a two-component, fast-setting, polyester resin-based mortar to bed and level manhole frames
- Ironmaster Mortar C — a two-component, non-shrinking, fast-setting cementitious mortar, used to bed and level ironwork in highly trafficked locations, such as junctions and turning areas
- 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, with a nominal 2 to 5 mm broadcasted aggregate.

2 Manufacture

2.1 The system components are manufactured using typical batch-blending processes.

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 Rhino Asphalt Solutions Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate 680322).

3 Delivery and site handling

3.1 The system components are delivered to site in the packaging and weights given in Table 1. The tubs and bags bear the Certificate holder's name and address, mixing instructions, and a hazard label.

Table 1 Packaging and weights

Component	Pack size (kg)	Packaging	Yield (litres)	Shelf-life (months)[2]
Ironmaster Mortar C (powder)	20	Bags	9.8[1]	6
Ironmaster Mortar C (liquid)	2.5	Bottles	9.8[1]	6
Ironmaster Mortar P	25	Tubs	12.5	6
Ironmaster Infill Mortar	25	Bags or tubs	12	6
Ironmaster Patch	25	Bags	12	12

(1) Combined powder and liquid.
(2) Information provided by the manufacturer.

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

3.3 The Certificate holder has taken the responsibility of classifying and labelling the system components under *the CLP Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

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

Design Considerations

4 Use

The Ironmaster Ironwork Reinstatement System is satisfactory when used for the installation and the reinstatement of ironwork with a cover and frame up to and including Group 4 of BS EN 124-1 : 2015, where rapid construction and trafficking is required.

5 Practicability of installation

Installation of the system must be conducted by the Certificate holder's approved specialist contractors experienced with this type of system.

6 Performance

6.1 Ironmaster Mortar P, when used as a bedding material, will achieve a nominal compressive strength of 30 $N \cdot mm^{-2}$ within one hour and so satisfy the requirements of the MCHW, Volume 1, Series 500, Clause 507, Chambers, 44.

6.2 Ironmaster Mortar P also meets the requirements for bedding materials of the MCHW, Volume 1, SHW, Series 500, Clause 507 Chambers, 24 (iii).

6.3 Ironmaster Mortar C satisfies the requirements of a bedding material in accordance with the MCHW, Volume 1, Series 500, Clause 507, Chambers, 24 (i) to (iv).

7 Maintenance

Monitoring of reinstatements by visual inspection should be carried out during routine inspections of the road network. Any damage must be repaired as soon as practicable (see section 12).

8 Durability

Provided the surrounding pavement remains structurally sound, the system will have an anticipated service in excess of five years.

Installation

9 General

9.1 The mixing and installation of the Ironmaster Ironwork Reinstatement System must be carried out in accordance with the procedures described in this Certificate and the Certificate holder's installation method statement and literature.

9.2 Precast concrete inspection chambers should comply with the requirements of BS 5911-4 : 2002 and BS EN 752 : 2017.

9.3 The system's compressive strength and rapid-setting characteristics are affected by temperature and must not be installed at temperatures below 5°C or above 30°C.

9.4 The system components are installed within the thickness limits given in Table 2.

Table 2 Minimum and maximum material thickness

Component	Thickness (mm)	
Ironmaster Mortar C	10	50
Ironmaster Mortar P	5	50
Ironmaster Infill Mortar	20	250

9.5 Ironmaster Patch is applied at a nominal 30 mm thickness in accordance with sections 11.12 to 11.15, ensuring compliance with applicable requirements for maximum depressions/crowning.

9.6 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 3 for Ironmaster Patch characteristics).

Table 3 Ironmaster Patch characteristics

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

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

9.7 Where other materials are to be used in conjunction with the system (eg to repair/rebuild the supporting structure) such materials should have a strength commensurate with the system in accordance with the MCHW, Volume 1, Series 500, Clause 507, Chambers 44 and 45.

9.8 The frame and cover should be aligned so as to ensure safe access to the reinstatement.

10 Preparation

10.1 A perimeter area, indicating the minimum width needed for excavation to include any defects, is marked out around the existing frame of a failed installation. The width from the edge of the ironwork to the edge of the repair should be between 100 and 750 mm.

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

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

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

Figure 1 Prepared excavation

10.5 The newly exposed substrate must be clean, dry and free from loose particles and other contamination. Checks must be made to confirm that it is of adequate size and strength to support the frame, cover and expected loading prior to commencing the reinstatement work.

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

10.7 The depth needed to install the frame and cover level to the road surface is determined and must take into account the depth of the frame and the manufacturer's maximum and minimum thicknesses (see Table 2).

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

10.9 Concrete structures must be repaired using suitable concrete repair techniques and materials. The Certificate holder must be consulted on suitable materials.

10.10 All old bedding material, loose paint, rust and any other debris must be removed from the frame prior to installation.

11 Installation

11.1 The appropriate bedding mortar is mechanically mixed as follows:

- Ironmaster Mortar P is 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
- Ironmaster Mortar C is prepared by mixing one bag/tub of powder with the Ironmaster Mortar C liquid component to obtain a stiff, non-slump mix with a uniform consistency. The amount of liquid may be adjusted to achieve the consistency required.

11.2 Depending on the depth of ironwork and excavation, the use of 30 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.

11.3 When using Ironmaster Mortar C, the substrate must be wetted prior to placing the mortar.

11.4 The mortar is immediately placed on the supporting structure, allowing a 5 mm excess thickness. Mortar must be mixed and used within the time defined in the Certificate holder's method statement.

11.5 The frame is lowered into position using a suitable lifting device and placed on the bedding mortar, ensuring that it is fully supported and that 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

11.6 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 carriageway.

11.7 Any holes within the frame are infilled and the flanges of the frame enveloped by a minimum thickness of 10 mm of the bedding material.

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

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

11.10 Ironmaster Infill Mortar 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.

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

Figure 3 Ironmaster Infill applied

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

11.13 The surface is then reinstated using Ironmaster Patch.

11.14 The Ironmaster Patch compound is heated to between 180 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).

Figure 4 Surface reinstated with Ironmaster Patch

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

Figure 5 Aggregate applied

11.16 The system must not be trafficked for a minimum period of one hour following completion of the installation to permit the components to develop adequate strength. After this period the site is cleaned and opened to traffic.

12 Repair

Any damage should be repaired by replacing the failed component(s) in accordance with sections 10 and 11.

Technical Investigations

13 Tests

Tests were carried out on the following components and results assessed to determine their properties:

Ironmaster Mortar P

- accelerated ageing
- shrinkage
- pot life

Ironmaster Mortar C

- workability
- shrinkage
- compression strength
- tensile strength

Ironmaster Infill Mortar

- freeze/thaw resistance
- shrinkage
- pot life.

14 Investigations

14.1 An evaluation was made of independent test data relating to the system components including:

Ironmaster Mortar P

- flexural strength
- compressive strength

Ironmaster Infill Mortar

- chloride content
- compressive strength

Ironmaster Patch

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

14.2 An assessment was made of independent test data relating to full-scale load tests to BS EN 124-1 : 2015.

14.3 A postal user survey was conducted to investigate the performance of the system in service.

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

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

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 + A2 : 2010 *Concrete pipes and ancillary concrete products — Specification for unreinforced and reinforced concrete inspection chambers (complementary to BS EN 1917 : 2002)*

BS EN 124 -1 : 2015 *Gully tops and manhole tops for vehicular and pedestrian areas. Definitions, classification, general principles of design, performance requirements and test methods*

BS EN 752 : 2017 *Drain and sewer systems outside buildings*

BS EN ISO 9001 : 2015 *Quality Management Systems - Requirements*

Manual of Contract Documents for Highway Works (MCHW), Volume 1*, Specification for Highway Works (SHW),* Series 500 *Drainage and Service Ducts*

15 Conditions

15.1 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.

15.2 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.

15.3 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.

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

15.5 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.

15.6 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.