CODE OF PRACTICE FOR
GROUTED MACADAM SURFACING

Machine Applied
Asphaltic Grouted Macadam

Machine Applied
Cementitious Grouted Macadam
Foreword

This first edition of the Code of Practice has been produced by the RSTA Grouted Macadam Committee. It has been reviewed in the context of the European Standard for Bituminous Mixtures BS EN 13108 published in 2006, with subsequent corrigenda, and along with the national guidance document PD 6691:2015.

This document has been peer reviewed by ADEPT Soils, Materials, Design and Specifications Committee.

The information contained herein is intended to represent industry best practice. No liability is accepted by RSTA or ADEPT for any damages caused to property or personal injury resulting from using the guidance contained within this document.

RSTA is the Road Surface Treatments Association
www.rsta-uk.org

ADEPT is the Association of Directors of Environment, Economy, Planning and Transport
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1 Introduction

This Code of Practice has been written by the Road Surface Treatments Association and ADEPT to assist procurers and installers to obtain a high quality durable surface.

It represents best practice for the selection and application of Grouted Macadam surfacing to maximise their performance and durability.

The purpose of Grouted Macadam surfacing is to re-profile and strengthen the road surface, to provide texture, skid resistance and prevent the ingress of water, therefore helping to maximise the service life of the asset. The cementitious option offers further strength and fuel resistance.

Grouted Macadam surfacing is preferable in many locations on the network to keep the road surface durable and adequately safe for road users.

To the highway engineer Grouted Macadam surfacing offers an alternative to standard asphalt and macadam surface courses, protecting roads against the damaging effects of traffic and water ingress.

To obtain the best results it is necessary to give careful consideration to a wide range of details, to plan and design the work carefully and to use only HAPAS (or equivalent) approved installers certificated to BS EN ISO 9001:2008 / 9001:2015 and National Highways Sector Scheme 16.

The type of situation in which the materials are applied and the prevailing ambient conditions at the time of installation are also important to ensure long term durability of the product.

The purpose of this Code is to identify the important aspects of the process, and to refer to other documents relating to good surfacing practice and so to give practical guidance on achieving high quality.

This document is to be reviewed annually jointly by RSTA and ADEPT.
2 Types of Grouted Macadam and Suitable Applications

There are two main types of Grouted Macadam surfacing – those grouted with an Asphaltic Grout and those with a Cementitious Grout. Both provide impervious finishes with an extended service life when compared to competing products in specific challenging situations. There is no British Standard design criteria for Grouted Macadams and so it is therefore important for the Client to satisfy himself that the Contractor has sufficient knowledge and experience, and that the product is suitably established and has been adequately tested and approved to perform as expected, and that it has demonstrated the durability required to meet the necessary service life.

Asphaltic Grout

An Asphaltic Grouted Macadam consists of a hot, paver laid, open graded asphalt purposefully designed receiving course, laid to a depth of between 30mm and 50mm, which is then sealed with an asphaltic grout. It provides an impervious surface course combating water ingress with flexibility to withstand underlying movement. The sealing of the surface course also prevents fretting, reduces the speed of binder oxidation and reinforces the strength and elastic stiffness of the surface course.

The material is ideally suited to the resurfacing of flexible or concrete rural and residential highways, including:

- Rural roads
- Residential Carriageways
- Concrete Inlays and Overlays

Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) of the aggregate can be specified by the Client to meet specific skid resistance and texture depth requirements in line with current guidance provided in Highways England Interim Advice Note (IAN) 154 and/or the Local Authority’s skid policy.

Cementitious Grout

A Cementitious Grouted Macadam consists of a hot, paver laid open graded asphaltic purposefully designed receiving course, typically laid to a nominal depth of between 35mm and 50mm with a controlled void content which is subsequently filled with a resin cementitious grout. This provides a hybrid between asphalt and concrete with fast installation, minimal downtime and a resulting stiffness that falls between concrete and conventional bituminous surfacing materials. It has a high heat resistance and is therefore less temperature susceptible than traditional bituminous materials. A flexible, jointless, heavy-duty surface course, it is capable of withstanding intense traffic loadings and fuel / leachate contamination to minimise rutting or deformation.

This material is ideally suited to the surfacing of high-stress areas, including:

- Bus lanes and lay-bys
- Transport hubs
- Roundabouts and junctions
- Industrial estates
- Distribution facilities
- Waste sites
- Ports
A Cementitious Grout can be coloured and/or combined with the use of a coloured aggregate.

Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) of the aggregate can be specified by the Client to meet specific skid resistance and texture depth requirements in line with current guidance provided in Highways England Interim Advice Note (IAN) 154 and/or the Local Authority’s skid policy.
3 Compliance

Quality Management

In order to demonstrate best practice, client organisations, including Local Authorities and Highways England, directly or through their maintenance contractor(s), are advised to use only installers who are certificated to each of the following Standards:


This is the world’s most established quality framework, suiting all organisations large or small and covering all sectors, helping them to succeed through improved customer satisfaction, staff motivation and continual improvement. Organisations certificated to BS EN ISO 9001:2008 / 9001:2015 are required to:

- Demonstrate their ability to consistently provide product(s) that meet customer and applicable regulatory requirements
- Enhance customer satisfaction through the effective application of a quality management system. This includes processes for continual improvement of the system and the assurance of conformity and applicable regulatory requirements.

All requirements of BS EN ISO 9001:2008 / 9001:2015 are generic and are intended to be applicable to all organizations, regardless of type, size and product or service provided.

Certification of suppliers should be carried out by certification bodies which have in turn been accredited by the UK Accreditation Service (UKAS).

National Highways Sector Schemes (NHSS) for Quality Management in Highway Works

These are bespoke quality management systems for organisations working on the UK road network. They are based on BS EN ISO 9001:2008 / 9001:2015 standards, but do not duplicate them; rather interpret them specifically to highways maintenance activities. The schemes aim to ensure that work is carried out to the highest standard of professionalism, using properly trained staff. They also place a strong emphasis on health and safety, support continuous improvement and provide a consistent and reliable base for benchmarking. The Well Managed Highway Infrastructure: A Code of Practice published by the UK Roads Liaison Group recommends that Local Authorities require Sector Scheme registration in their specifications.

NHSS includes more than 20 individual schemes. Each scheme is developed and managed by technical advisory committees made up of industry representatives and other interested parties, such as local authorities, trade associations and certification bodies.

Certification of suppliers should be carried out by certification bodies which have in turn been accredited by the UK Accreditation Service (UKAS).

The following National Highways Sector Schemes are applicable to Grouted Macadam operations:

- Scheme No. 16 – For the Laying of Asphalt Mixes

Sector Scheme Documents are available from the UKAS website: www.ukas.com.
The Highway Authorities Product Approval Scheme (HAPAS)
This was initiated by the British Board of Agrément (BBA) in 1995 to provide a nationally recognised approval scheme for innovative products and systems used in highway works.

Grouted Macadam surfacing is deemed to be a restricted product sector for which a certificate is issued through the one-off assessment procedure. HAPAS approval incorporates laboratory and road tests, site inspection, performance trials and evaluation of production.

The issue of HAPAS 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

Further details are available on the BBA website [www.bbacerts.co.uk](http://www.bbacerts.co.uk).

As each of the above requires the installer to be subjected to periodic independent inspection and audit of product, service and performance, clients can reduce the need for their own site testing and audit, with a consequent reduction in resource requirements and costs, through their use of contractors who are certificated to:

- BS EN ISO 9001:2008
- National Highways Sector Scheme 16
- HAPAS (or equivalent)

Membership of the Road Surface Treatment Association (RSTA)
This is available to contractors who have third party quality management accreditations for the Grouted Macadam work they undertake. The unanimous decision of the Association is to adopt this principle as an indication of its commitment to quality in all of its undertakings.

The setting up and maintenance of a quality management system represents a substantial investment of time and resource by member companies. Those costs will inevitably be reflected in the unit prices tendered for Grouted Macadam surfacing. Grouted Macadam Contractors who are not members of the RSTA and have not invested in quality management may therefore be in a position to offer lower contract rates, but it follows that their work may be of a lower quality than that carried out by RSTA member contractors.

The Association does not see the requirement for quality management as a restriction to competition but rather as a method of ensuring fair competition between contractors, giving maximum value for money that should be implicit in all work undertaken for public bodies.
Health, Safety and Environment

All of those involved in preparing and executing Grouted Macadam surfacing operations have a legal duty of care for the health and safety both of the operatives carrying out the works, and those who come into contact with the operation whilst in progress and during aftercare.

The planning and organising for health, safety and environmental issues must commence as soon as a Grouted Macadam surfacing programme is envisaged. The Construction (Design and Management) Regulations 2015 will apply to most operations and therefore clients are urged to follow closely the advice given in the relevant Guidance Document L153 as the Client has specific responsibilities under the Regulations for initiating the framework for safe working practices. This will enable the Principal Contractor to plan and prepare the information and documentation necessary to ensure the specific hazards are identified on the various sites and the level of risk they present. This must take into account the nature of the site, the materials to be used, the traffic management requirements and any special health, safety and environment issues that have become evident during the pre-construction stage.

The Client has a responsibility to employ a competent contractor. In addition to the standards mentioned within the Quality Management section of this document, in specific relation to Health, Safety and Environment it is recommended that the simplest way for a client to assess competence is to select at tender stage a contractor holding certification to:

- BS EN ISO 14001:2004 – Environmental Management Systems

The pre-construction information contained in the tender document should be detailed enough for the prospective contractor(s) to take account of the health, safety and environment issues in their tender submission.

On the appointment of a Principal Contractor to carry out the Grouted Macadam surfacing operations, it will be their duty to prepare a detailed Construction Phase Plan for that particular contract or works from the pre-construction information supplied by the Client and/or Designer(s). This must itemise the methods to be employed to overcome the specifically identified hazards and risk reduction measures that will be in force on the contract.

Once the works commence the Principal Contractor is responsible for ensuring that the site safety of all contractors is managed via the induction of all contractors, the monitoring and reviewing of contractors’ health and safety performance, supplying suitable information in relation to site health and safety, ensuring that adequate welfare facilities are provided, securing the site, liaison with all other appointments under the regulations and, if relevant, supplying information to the Principal Designer to be retained within the Health and Safety File.

The Principal Contractor has additional duties under other legislation to look after the health and safety not only of his own employees but of other persons who work alongside them and also of the passing public. Specific risk assessments must be documented, identifying suitable and sufficient control measures for both physical and chemical hazards. The measures must form the basis of the Contractor’s Method Statements and Safe Systems of Work, providing a structure for the safe behaviour of the workforce as well as protecting the general public during the various stages of the works. These measures must be communicated to all involved in the project.
Account must also be taken of environmental factors with pollution from fumes, noise and dust being the main concern during the Construction Phase. Disposal of waste and protection from spillage and contamination are other considerations when looking at the overall surfacing activity.

**Training**

The design of Grouted Macadam surfacing and its installation is dependent on a wide range of factors and close attention to detail. As a specialist product only a limited number of engineers and technicians have had any training in the design, specification and execution of the work. This lack of understanding of the product often results in inappropriate selection of materials and unsatisfactory preparation and installation – leading ultimately to premature failure of the surface. It is therefore important to avoid this through the selection of a competent contractor employing competent personnel – those with sufficient education, training, skills and experience to enable them to perform tasks identified as their direct responsibility and to meet the requirements of the contract.

The National Highway Sector Scheme 16 for the Laying of Asphalt Mixes interprets the requirements of BS EN ISO 9001:2008 in specific relation to the laying of asphalt mixtures and as such requires that organisations demonstrate their commitment to the development and training of personnel, and stipulates that appropriate levels of competency, experience and qualification, training and staffing shall be determined and substantiated and regularly reviewed by the organisation. It also provides suggested guidelines for the demonstration of competency requirements for organisation personnel.

It is the RSTA’s view that a competent qualified workforce makes a fundamental contribution to achieving high quality durable Grouted Macadam surfacing and suggests that:

- Operatives should hold appropriate CSCS cards and/or relevant CPCS cards for plant used.
- Contract Supervisors should hold a CSCS Supervisors Card (gold) – incorporating achievement of NVQ Level 3 in a relevant construction occupation.
- Contracts Managers should hold a CSCS Managers Card (black) – incorporating achievement of NVQ Level 4, 5, 6 or 7 in a relevant construction management occupation.
- There is adequate internal resource qualified to recognised health and safety qualifications, for example: National Examination Board in Occupational Safety and Health (NEBOSH), Site Management Safety Training Scheme (SMSTS), Site Supervisors Safety Training Scheme (SSSTS).
- There is adequate internal resource qualified to recognised professional qualifications, for example: University Diploma in Road Surface Treatment, and appropriate Civil Engineering qualifications.
4 Planning the Works

Product Specification

It is important to ascertain the most applicable type of Grouted Macadam, given the two systems available and bearing in mind the traffic use, road condition and available methods of working for any curing period.

The selection of the right type of Grouted Macadam surfacing, preparatory works needed and nominal thickness is as important as the design of other engineering works. Each site must be considered in light of its unique characteristics including site levels, nature and condition of surface, situation, volume / speed of traffic and type of vehicles using the section of road.

The design considerations of Grouted Macadam surfacing are particularly important in order that the treatment applied to the surface is right for the circumstances in which it has to operate and the job it has to do. In consultation with the Client, the Contractor will recommend the type of Grouted Macadam to be used, the appropriate depth of receiving course, and the grout spread rates to be achieved. The product must have HAPAS (or equivalent) certification, and the Contractor must provide evidence that the product will work on the type of site it is to be used on.

Planning and Co-ordination

Careful and detailed planning before work commences is an essential element of successful Grouted Macadam surfacing. It is in the interests of both installers and clients that the programme of works flows smoothly, and therefore there must be close co-ordination between installers and clients at every stage, commencing with a pre-works meeting – the purpose of which is to ensure total understanding of the way that the programme of works will proceed.

Working under a road closure offers significant advantages in terms of speed of installation and safety, although these require a significant notice period to organise, which needs to be taken into consideration at the time of contract award.

The Client must be aware that a significant reduction in the size of the indicated site / programme will increase the installer’s overhead costs per square metre of work undertaken. Significant changes can lead to a compensation event and contracts should make provision for compensating installers under these circumstances.

Before any Grouted Macadam surfacing is undertaken, it is important to identify the area to be treated. A clearly understandable system such as a line, arrow and job number on the road surface is recommended.

Prior to commencement the Client must give the chosen installer the opportunity to inspect all old surfaces included in the programme, and then it is the installer’s responsibility to report details of any repairs needed to make the surface suitable for the application of the Grouted Macadam they intend to install.

Site Information

It is important that all personnel in charge of Grouted Macadam surfacing operations on site fully understand the type and extent of the work and the Client’s requirements. To ensure this there ought to be clearly documented information for each contract. The documents
shall be in sufficient detail for the scope of the works to be clearly identified and all necessary Health and Safety issues identified.

**Information to be Provided by the Client**

The specification documents should state:

- The product and the requirement for its, and the Contractor’s, certification to recognised standards (ie. BS EN ISO 9001, NHSS Scheme 16, HAPAS (or equivalent), BS EN ISO 14001, OHSAS 18001).
- The type of Grouted Macadam to be used.
- A clear site drawing indicating the area to be treated.
- The size of the area.
- The speed limit for the road.
- The existing surface type on which the Grouted Macadam is to be installed and the depth to which it requires planing.
- Any presence of tar in the underlying surface.
- Any requirement for binder course repairs.
- The period over which the works are to take place.
- Colour requirement for the site (if applicable).
- Specific traffic management required and responsibility for provision of this.
- Other site specific requirements eg. noise, access.
- Requirement for road markings (e.g. mask existing / cover / remove and cover / new), and responsibility for these.
- Requirement for lifting ironworks in line with Advice Note HA104 from the Design Manual for Roads and Bridges.
- Specific texture depth and skid resistance requirements.

**Contractor’s Quotation / Tender Submission**

This should explain the Contractor’s choice of material and thickness based on the client tender and/or site inspection (either with or without client representation). It should also detail any areas of concern for further discussion, and highlight client involvement issues eg. compliance with HSE Guidance Note GS6 – Avoiding Danger from Overhead Power Lines, and product choices eg. aggregate PSV. It should also detail or bring forward for discussion traffic management issues or particular site sensitive issues. It should ideally be based on a client plan, and a level survey where required.

**Pre-Contract Meeting**

Once the Client has decided to proceed, a joint site inspection should be undertaken to discuss the issues raised in the quotation. In the course of this inspection particular care should be paid to the levels, kerb heights, road condition etc. These should be discussed as should the need for planing or channel planing, kerb re-adjustment, pre-patching or regulating as part of the process. This ensures all parties know exactly what should happen and when. This is the Contractor’s opportunity to agree or not to carry out the work as specified. Other issues that should be addressed are illustrated below:

- The Contractor cannot do the works as first perceived, alternative methods discussed and agreed.
- Plan appropriate traffic management.
- Requirements for resident access.
- Programme timescale.
- Time constraints and out-of-hours working.
• Weather effects on programme.
• Substrate condition, suitability and repair requirements.
• Need for regulating materials.
• PSV, AAV and texture depth requirements outside of certification / normal parameters.
• Curing time requirements.
• Guarantee / Warranty to be offered.

Health and Safety Documentation
It is imperative that all significant hazards/impacts within the scope of activities are identified and eliminated wherever possible. Where hazard/impact elimination is not possible, suitable control measures must be identified and implemented to reduce the risk “so far as is reasonably practicable” to a risk level that becomes acceptable. In order to evidence that this has taken place, the following documentation should be produced:

• Risk Assessment(s)
• Method Statement(s)
• Safe System(s) of Work
• Construction Phase Plan (where the Contractor is acting as Principal Contractor for the purpose of the Construction (Design and Management) Regulations 2015.
• Relevant Permits – GS6, Hot Works etc

Planning for Execution of the Works

Plant, Vehicles and Equipment
In addition to compiling the site information, the person supervising the treatment will need to decide which plant and equipment is required, and specifically which size of paving machine to use and where joints are to be located. Joints can become weak points on any treatment. For that reason with proper planning the number of joints made should be kept to a minimum

The noise and vibration levels of all plant should be ascertained from manufacturers or suppliers. If they are not available, the user must take measurements themselves and ensure that all operators are provided with the correct protection, where necessary. All plant, vehicles and equipment should be adequately maintained with regular inspection reports available.

Advance Notification
Poor planning can result in low daily output, increased costs and public criticism. Supervisory staff will give proper consideration to the order in which various sections are treated and the number of vehicle movements transporting materials to the site.

As Grouted Macadam surfacing works are normally of a short duration and dependent upon favourable weather forecasts, it is difficult to predict accurately when traffic flow at any particular site is likely to be affected. It is essential therefore that every possible method should be utilised to inform the road user that a site is to be affected. Press releases to local papers, district and parish councils, local radio etc can all help. The most effective methods are:

• The display of information boards at each site saying that surfacing works are to be carried out and when.
The distribution of leaflets/letters to all dwellings and premises and attached to all parked vehicles (loosely under windscreen wipers) detailing what works are to take place and when.

In addition, emergency services, bus operators and any other organisation likely to be affected by work at a particular site should be notified in advance.

At the planning stage consideration must be taken to the recommendations of the Traffic Signs Manual Chapter 8 – Traffic Safety Measures and Signs for Road Works and Temporary Situations, the objectives of which are to maximise the safety of the workforce and the travelling public, and to keep traffic flowing as freely as possible.

Temporary diversions should not be introduced casually and will involve consultations between the Contractor(s) and the Local Authority. Legal processes often need to be followed to arrange closures or diversions, and these can take up to 13 weeks.

Identifying Traffic Management Requirements

In undertaking Grouted Macadam surfacing the needs of road users must be considered at all stages. The safety of operatives and the public, whether on foot or in motor vehicles, is paramount.

Responsibility for traffic management may lie with either the Client or the Contractor and this needs to be established at the planning stage.

Traffic management requirements for each site should be considered unique. A risk assessment should be undertaken by an appropriately trained person and acted upon before operatives are dispatched to the site. At some sites, this will require discussion between the Contractor and/or Client and representatives of Highways England at the pre-contract stage. Where this is the case, the agreement reached between the parties should be passed on to the person controlling site operations.

The correct selection of traffic management system to be adopted is important. The public should not be unduly inconvenienced by detours or long delays. When considering traffic management arrangements, the following factors need to be taken into account:

- Traffic flow data
- Road layout and junctions

This information will inform the decision as to the type of traffic control required, eg. restricted hours of working, maximum working lengths, no parking, availability of alternative routes, level of advance publicity needed, etc.

Some highway authorities use mandatory speed limits to control traffic speeds while surfacing works are in progress. If the road in question is a trunk road the consent of the Regional Director’s Office of the Highways Agency is required. In other cases, local highway authorities have powers under Section 14 of the Road Traffic Regulation Act 1984. Where local authorities wish to use these powers they should first be discussed with the Chief Constable who will have the task of enforcing any orders that are made. Highway authorities may then give notice of a temporary speed limit on a list of roads, usually main roads or roads where traffic speeds are unusually high. The usual procedure is for the Local Authority to give their engineer authority, at the appropriate time, to apply the orders that have been approved. Once the order has been applied it may remain in force for a maximum of 14 days, which is normally far longer than is necessary for Grouted Macadam surfacing operations. The speed limit selected is usually 20 mph.
Although the use of mandatory speed limits may be helpful in exceptional circumstances experience suggests that controlling traffic speeds by reducing lane widths and the creation of convoys is likely to prove more effective.

Where the whole width of the road is not to be treated in one pass and one-way traffic operation is contemplated, it is essential to ensure that the width of road available to passing traffic is not less than the desirable minimum of 3.25 metres or the absolute minimum of 3 metres set out in paragraph D3.3 of Chapter 8 of the Traffic Signs Manual. Where these widths are not available, the interests of safety suggest that it is preferable to divert traffic away from the road, subject to a risk assessment and length of the diversion that would be necessary. Where a road is to be temporarily closed to allow Grouted Macadam operations to be carried out safely, proper contingency arrangements must be made to allow for the passage of emergency vehicles.

Not only is it important that signs are placed in accordance with the principles outlined in Chapter 8 of the Traffic Signs Manual, it is also important that a safe system of work is operated to ensure the safety of the operators when placing signs.

Legal processes, such as allowing the closure of a road or imposing mandatory speed limits, need to be arranged by the highway authority well in advance of the works – at least 13 weeks’ notice is required.

All Traffic Management installations must be undertaken by a contractor certified to National Highways Sector Scheme 12.

Aggregate Materials
The support coat will consist of a 0/14mm open-graded surface course, and the Contractor’s HAPAS (or equivalent) Agreed Method Statement and Agreed Quality Plan will fully detail the mix design for this receiving substrate – in relation to Coarse Aggregate, Fine Aggregate, Filler and Binder content.

It is a requirement of the Contractor’s certification to National Highways Sector Scheme 16 that materials are sourced from a coating plant that complies with CE Marking requirements, to include FPC (factory production control) to EN13108-21. This certification should be verified in advance of the materials being requisitioned, with documentation kept on file for traceability.

The materials will be delivered and installed in accordance with BS 5949-87:2015: Asphalt for Roads and Other Paved Areas – Specification for Transport, Laying, Compaction and Product-Type Testing Protocols and with the Contractor’s HAPAS (or equivalent) Agreed Method Statement.

Appointment of Sub-Contractors
Suitably competent and approved sub-contractors will be identified, issued with their orders and instructions, and required to provide Risk Assessments and Method Statements for any of their works falling outside of the scope of the Principal Contractor’s own documents.
5 Execution of the Works

Arrival On-Site
The area(s) to which Grouted Macadam surfacing is to be applied shall be clearly defined by the Client prior to commencement of the installation work on-site.

All operatives and sub-contractors will be met on site by the supervisory personnel and inducted and briefed on the contents of the Risk Assessment and Method Statement. Site personnel will sign their attendance and understanding.

Operatives should hold appropriate CSCS cards and/or relevant CPCS cards for plant operated. Contract Supervisors should hold a CSCS Supervisors Card (gold) and Contracts Managers should hold a CSCS Managers Card (black).

Preparatory Work

Traffic Management
All Traffic Management installations must be undertaken by a contractor certified to National Highways Sector Scheme 12.

Where one-way traffic is to be operated using “Stop and Go” boards as described in Traffic Signs Manual Chapter 8 – Traffic Safety Measures and Signs for Road Works and Temporary Situations, the operators of these signs should be appropriately trained, be in radio communication with one another, and one of the operators should be nominated as being in overall control of the traffic flow arrangements. On roads where it is not possible to provide the desirable safety zone between surfacing plant/operatives and moving traffic, the speed of traffic past the works should be restricted to a maximum of 20 mph.

The length subjected to this operation should be kept as short as possible. Experience suggests that the safest method of operation is to treat one half of the road for the total length of the section. Traffic should be controlled to allow all plant and equipment to turn safely and position itself to treat the second half of the road.

Site Signage
For the safety of drivers, pedestrians and operatives, traffic passing over partially or newly treated roads, or alongside surfacing works that are in progress, must be properly controlled.

In addition to advance warning and traffic management, there should be regular reminders throughout the site of the risk presented by temporary road surface, raised ironworks etc.

Where surfacing works result in the obliteration of “Stop” and “Give Way” markings on the carriageway, the appropriate warning signs should be provided as per The Traffic Signs Regulations and General Directions 2002.

Unless Highways England have given approval in writing to the use of a sign not included in the Traffic Signs Regulations and General Directions 2002 and subsequent amendments, only signs approved by Statutory Instrument should be used. Where such signs are used, they should be provided in addition to, rather than instead of, approved signs. Should a member of the travelling public make a claim against the Contractor and/or the Local Authority, the use of the correct signs located in the correct positions is likely to be taken into account by the courts.
Planing Works
Depending on the surface on which the Grouted Macadam is to be laid, there will often be a requirement for removal through planing (cold milling). This will usually be arranged by the Contractor and undertaken by a suitably competent specialist contractor.

It is important to note that if any tar has been identified in the existing surface this will be removed to an appropriately licensed waste site at the cost of the Client, following guidance provided in the ADEPT guidance note Managing Reclaimed Asphalt – Highways and Pavements.

Surface Preparation
Any necessary remedial works to the road surface and structure (for example, reinstatement of ironworks, kerbs, installation of geotextile fabrics and binder course repairs) shall be carried out and completed either prior to the commencement of works, or as part of the Contract, as agreed between the Contractor and Client.

Inadequate preparation can be a problem potentially leading to some de-bonding failures. Mechanical sweepers will be used to clean the road before Grouted Macadam surfacing is carried out, and in extreme conditions additional measures such as machine pressure washing may be required. The swept surface will be in a clean condition, free of debris and other foreign matter, prior to the installation of the Grouted Macadam surfacing.

All temporary materials, eg. deferred set macadam containing soft binders, will be removed and replaced with appropriate permanent asphalt materials as specified by the Client’s Engineer. These can include hotmix asphalt or HAPAS (or equivalent) approved permanent cold lay surfacing materials (PCSMs).

All ironworks, gullies, kerbs and other adjacent structures will be masked off or protected as required by spray boards during the surfacing operation.

Weather Conditions

Weather conditions in the UK generally allow the Grouted Macadam surfacing to be laid throughout the year. Weather conditions will dictate the period of time before the Grouted Macadam surfacing can be opened to normal traffic.

The receiving course must be stable for the grouting process to be effective. Installation of the Grouted Macadam surfacing in adverse weather should only be carried out in accordance with BS 594987:2015: Asphalt for Roads and Other Paved Areas – Specification for Transport, Laying, Compaction and Product-Type Testing Protocols, as reflected in the HAPAS (or equivalent) Agreed Method Statement for the product concerned.

Laying of the receiving course and the grout shall not be carried out if free standing water, ice or snow is present, or during periods of heavy rain. The Grouted Macadam surfacing can be installed on a damp substrate subject to the appropriate ambient temperatures being met.

Installation shall only be carried out at an average road surface temperature and air temperature of 1°C and rising. Laying shall cease when the air temperature reaches 0°C on a falling thermometer, except in calm dry conditions when laying shall cease if the air temperature reaches -3°C on a falling thermometer.
There is no upper air or surface temperature limit when installing Grouted Macadam, and elevated temperatures during summer months actually help the Grouted Macadam material to dry out quickly, although extreme conditions may delay the grouting operation process.

Time critical or traffic management dependent installations of the Grouted Macadam surfacing below such ambient weather conditions will only be considered when expressly agreed in advance between the Contractor and the Client on a project specific basis.

Ambient temperatures for the individual site will be recorded twice daily and used for monitoring purposes.

If a section of the Grouted Macadam surfacing is affected by inclement weather conditions during installation then the area shall be monitored to assess the need for re-grouting. A joint inspection may be required to assess the affected area.

**Support Coat**

Once the preparatory works have been carried out satisfactorily the laying operation will commence.

**Installation of the Support Coat**

This will be carried out in accordance with BS 594987:2015: Asphalt for Roads and Other Paved Areas – Specification for Transport, Laying, Compaction and Product-Type Testing Protocols, which provides guidance on machine and hand application, contours and falls, ironwork, joints and methods of compacting.

The thickness of surface course will be nominally 30-50mm for Asphaltic Grout, and 35-50mm for Cementitious Grout.

The Contractor will use his experience to identify and apply appropriate surface preparation in order to ensure good adhesion of the surface course to the underlying layer – usually a K1-40 tackcoat or suitable bond coat, unless laying onto newly applied material.

The coated material delivered to site will be checked against the delivery ticket for adherence to order specification, including PSV and aggregate size. Material will also be checked visually, and will be temperature tested to ensure it falls within acceptable parameters – as defined within BS 594987:2015: Asphalt for Roads and Other Paved Areas – Specification for Transport, Laying, Compaction and Product-Type Testing Protocols, and adapted for any proprietary material specifications.

Once accepted the material delivery vehicle will be allowed to reverse up to the paving machine under the guidance of a Banksman. The vehicle will then be tipped to allow material to fill the hopper of the paving machine, and will remain tipped to allow the paver to push the delivery vehicle forward during the laying operation.

The required depth of application is set through the use of an adjustable floating screed, and the Contractor will use his experience of mix design and machine application together with periodic depth and level measurements to ensure that the desired thickness is consistently achieved – incorporating any requirement for regulating and/or repilling.

The Contractor will inspect the newly laid surface for segregation, dragging, burning, surface defects or any other irregularities. If such defects are identified, these will be addressed before compaction.
Whilst still warm, the surface will be compacted using a steel wheeled vibratory roller fitted with wetting devices. Rolling shall be undertaken in such a way as to achieve the correct surface profile and finish and the required degree of compaction. Surface joints will be flush upon compaction, and compaction shall be such that there are no distinct roller marks left on the surface. Rollers shall not be allowed to stand on compacted surfaces that are still warm enough to result in indentation.

Records will be kept for traceability of materials delivered, quantity applied, laid depth and area covered.

**Joints**

Joints, both longitudinal and transverse, are potential points of weakness. Longitudinal joints should not therefore be located where they will coincide with the wheel tracks of vehicles. Consequently, the best position for a joint is on the centre line of a road or on the line separating adjacent traffic lanes.

As part of the Grouted Macadam process the open joint faces and faces of ironworks and kerbs do not require painting.

Where Asphaltic Grout is being used as an overlay to a concrete surface pre- and post-installation joint treatment will be carried out by the Contractor to protect against water ingress and consequent damage to the structural integrity of the road.

**Application of Grout**

After compaction the Contractor will give the newly laid surface a final inspection, and any defects will be addressed, before the application of grout commences.

Asphaltic Grout will be manufactured in accordance with the requirements of ISO 9001:2008, and as per the HAPAS (or equivalent) Agreed Method Statement and Agreed Quality Plan.

**Asphaltic Grout**

The manufactured material will be delivered to site and applied to the surface as soon as possible after compaction.

The Asphaltic Grout will be progressively poured onto the compacted surface, and pushed out by squeegee and/or brush to ensure a coating is applied to all parts of the support coat.

This will then be allowed to percolate into the surface, with the use of a wet wheel vibrating roller to assist in the percolation.

The surface will then be brushed either mechanically or by hand to remove the surface grout and provide the necessary surface texture finish. Where the grout is applied to a carriageway a mechanical brush must be used.

The Contractor will inspect the grouted surface for quality and curing, and when satisfied that the material is ready, the site will be opened to traffic.

Records will be kept of the quantity of grout used and the area covered. From this a spread rate will be calculated and confirmed as within acceptable tolerances as defined within the HAPAS (or equivalent) Agreed Method Statement and Agreed Quality Plan.
Cementitious Grout
The manufactured material will be delivered to site in powdered form. Once on-site it will be mixed with a controlled water content as per the HAPAS Agreed Method Statement and Agreed Quality Plan. It is applied to the surface when the surface temperature is below 40 degrees centigrade.

The Cementitious Grout will be progressively poured onto the compacted surface, and pushed out by squeegee and/or brush to ensure a coating is applied to all parts of the support coat.

This will then be allowed to percolate into the surface, with the use of a wet wheel vibrating roller to assist in the percolation.

The surface will then be brushed either mechanically or by hand to remove the surface grout and provide the necessary surface texture finish. Where the grout is applied to a carriageway a mechanical brush must be used.

With agreement from the Client, a 2mm grit can be scattered on the grouted surface to encourage early wear of surface grout so as to expose the aggregate.

The Contractor will inspect the grouted surface for quality and curing, and when satisfied that the material is ready, the site will be opened to traffic.

Records will be kept of the quantity of grout used and the area covered. From this a spread rate will be calculated and confirmed as within acceptable tolerances as defined within the HAPAS (or equivalent) Agreed Method Statement and Agreed Quality Plan.

Road Markings
Some instructions such as “Stop” and “Give Way” are indicated by carriageway markings and/or by mounted signs. When these carriageway markings are removed or covered by surfacing works, it is important to replace them as soon as possible or to provide temporary signage during the period prior to their permanent replacement.

Asphaltic Grout
Road markings may be applied as soon as the surface is cured (which will depend on ambient temperatures). The use of drying lances using high heat and high pressure compressed air must be avoided, however, gentle heat and low pressure high volume compressed air can be used to dry the surface prior to application.

Cementitious Grout
When installing traffic markings onto a Cementitious Grouted Macadam, ideally the aggregate should be exposed either through traffic wear or by artificial means (eg. shotblasting or scabbling) and an appropriate primer must be used.
6 Post Installation Assessment and Monitoring

Verification of Laid Product

The Contractor will ensure that a process is in place for a technical review to be conducted at the end of each contract, where surface types and materials are evaluated against defined standards to ensure that the product is within acceptable tolerances.

Installation Checks and Product Testing

The Contractor will ensure that a process is in place to ensure that finished surfaces are subject to testing programmes that verify the quality of product, ensure customer satisfaction and identify non-conformities so as to instigate corrective and preventive actions required.

Methods of testing will include visual inspection, laboratory analysis of liquid and powder grouts, analysis of core samples, sand tests, pendulum skid tests and grip tests.

Rectification of Defects

Occasionally there can be surface grout loss through exposure to rain or frost. Re-grouting as a remedial measure is recommended as soon as is reasonably possible. However, many areas will not require such measures and will settle as traffic and weather wear the material to an overall uniform state.

If damage or structural failure is found, the material can be saw cut or planed out to its full depth and re-installed.

Occasionally there can be fretting of the material at a longitudinal or transverse joint or with the existing substrate. This can normally be treated by overbanding with a bituminous or cementitious mixture.

Aftercare and Maintenance

The durability of a Grouted Macadam surface means that there is little or no requirement for its aftercare, although it is important to select a Contractor who offers a Utility Repair Service should this be required.
APPENDIX A – Checklists

Pre-Contract Checklist for the Client

1. Does the tender document specify that contractors must be certificated to:
   - BS EN ISO 9001:2008 – Quality Management System Requirements
   - National Highways Sector Scheme 16 – For the Laying of Asphalt Mixes
   - HAPAS (or equivalent)
   - BS EN ISO 14001:2004 – Environmental Management Systems

2. Has the Contractor provided evidence of certification to the above standards?

3. Has the Contractor been provided with all relevant site information eg.?
   - The product and the requirement for its, and the Contractor’s, certification to recognised standards (ie. BS EN ISO 9001, NHSS Scheme 16, HAPAS (or equivalent), BS EN ISO 14001, OHSAS 18001).
   - The type of Grouted Macadam to be used.
   - A clear site drawing indicating the area to be treated.
   - The size of the area.
   - The speed limit for the road.
   - The existing surface type on which the Grouted Macadam is to be installed and the depth to which it requires planing.
   - Any presence of tar in the underlying surface.
   - Any requirement for binder course repairs.
   - The period over which the works are to take place.
   - Colour requirement for the site (if applicable).
   - Specific traffic management required and responsibility for provision of this.
   - Other site specific requirements eg. noise, access.
   - Requirement for road markings (e.g. mask existing / cover / remove and cover / new), and responsibility for these.
   - Requirement for lifting ironworks in line with Advice Note HA104 from the Design Manual for Roads and Bridges.
   - Specific texture depth and skid resistance requirements.

4. Has a Purchase Order been provided for the works?

5. Have both the Client’s and the Contractor’s responsibilities under the Construction (Design and Management) Regulations 2015 been met?

6. Has the programme date been fixed, and a start date agreed for the Contract Meeting?

7. Has the Contractor provided a Risk Assessment and Method Statement for the works?

8. Are the traffic management arrangements in place, including traffic orders if necessary?

9. Have the training records for the staff and operatives to be utilised been inspected?

10. Has a Pre-Contract Contract Meeting been held with the Contractor on site?
Post-Contract Checklist for the Client

1. Has the site been inspected for quality?
2. Have requirements for performance / quality testing been agreed?
3. Has the road been re-opened to traffic?
4. Has all plant and equipment been removed from site?
5. Are signs (eg. ‘No Road Markings’) being maintained in a satisfactory condition with a schedule set for removal when required?
6. Is the required contract information being collected and documented?
7. Have arrangements been made for the replacement of road markings?
8. Have arrangements been made for further post-contract inspections?
8 APPENDIX B – Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGGREGATE ABRASION VALUE (AAV)</td>
<td>The resistance of aggregate to wear by abrasion.</td>
</tr>
<tr>
<td>ADEPT</td>
<td>Association of Directors of Environment, Economy, Planning and Transport, previously known as the County Surveyors Society (CSS).</td>
</tr>
<tr>
<td>ADHESION</td>
<td>The property by means of which a binder sticks to the surface of a solid body, e.g. the road or chippings.</td>
</tr>
<tr>
<td>AGGREGATE</td>
<td>Aggregate from mineral sources which has been subjected to nothing more than mechanical processing and which has a particular grading.</td>
</tr>
<tr>
<td>BBA</td>
<td>British Board of Agrément</td>
</tr>
<tr>
<td>BINDER</td>
<td>Material serving to coat the particles of an aggregate and to assure its cohesion.</td>
</tr>
<tr>
<td>BINDER CONTENT</td>
<td>Difference between 100% and the percentage water content determined in accordance with BS EN 1428:2012. (BS434-2:2006).</td>
</tr>
<tr>
<td>BITUMEN</td>
<td>Virtually in-volatile, adhesive and waterproofing material derived from crude petroleum, or present in natural asphalt, which is completely or nearly completely soluble in toluene, and very viscous or nearly solid at ambient temperatures.</td>
</tr>
<tr>
<td>BITUMEN – MODIFIED</td>
<td>Bituminous binder whose rheological properties have been modified during manufacture by the use of one or more chemical agents. In this context, “chemical agent” includes natural rubber and synthetic polymers but not sulphur and certain organo-metallic compounds, oxygen or oxidation “catalysts” such as ferric chloride, phosphoric acid and phosphorus pentoxide. Fibres and inorganic powders (“fillers”) are not considered to be bitumen modifiers.</td>
</tr>
<tr>
<td>BITUMEN – PAVING GRADE</td>
<td>Bitumen used to coat mineral aggregate mainly used in the construction and maintenance of paved surfaces and hydraulic works.</td>
</tr>
<tr>
<td>BITUMEN – POLYMER MODIFIED</td>
<td>Modified bitumen in which the modifier used is one or more organic polymers.</td>
</tr>
<tr>
<td>BITUMEN – EMULSION</td>
<td>Liquid product in which a substantial amount of bitumen is suspended in a finely divided condition in an aqueous medium by means of one or more suitable emulsifying agents.</td>
</tr>
<tr>
<td>BOND</td>
<td>The adhesion between the Grouted Macadam surfacing material and the underlying substrate.</td>
</tr>
<tr>
<td>BREAK (EMULSION)</td>
<td>The coagulation of the dispersed bituminous phase of an emulsion when in contact with mineral aggregate.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>BSI</td>
<td>British Standards Institution.</td>
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<tr>
<td>CATIONIC BITUMEN EMULSION</td>
<td>Emulsion in which the cation of the emulsifier is at the interface with the bitumen particle that is positively charged and in which the aqueous phase is normally acid.</td>
</tr>
<tr>
<td>CSCS (CONSTRUCTION SKILLS CERTIFICATION SCHEME)</td>
<td>The leading skills certification scheme within the UK construction industry. CSCS cards provide proof that individuals have the required training and qualifications for the type of work they carry out. CSCS is administered by the Construction Industry Training Board (otherwise known as CITB).</td>
</tr>
<tr>
<td>CDM</td>
<td>The Construction (Design and Management) Regulations 2015 which place duties on Clients, Designers and Contractors in relation to management arrangements and practical measures for construction projects.</td>
</tr>
<tr>
<td>CLIENT</td>
<td>As defined in The Construction (Design and Management) Regulations 2015: Any person for whom a project is carried out.</td>
</tr>
<tr>
<td>CONSTRUCTION PHASE</td>
<td>As defined in The Construction (Design and Management) Regulations 2015: The period of time beginning when the construction work in a project starts and ending when the construction work in that project is completed.</td>
</tr>
<tr>
<td>CONSTRUCTION PHASE PLAN</td>
<td>As defined in The Construction (Design and Management) Regulations 2015: A plan drawn up that must record:</td>
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<tr>
<td></td>
<td>• Health and safety arrangements for the Construction Phase</td>
</tr>
<tr>
<td></td>
<td>• Site rules;</td>
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<tr>
<td></td>
<td>• Where relevant, specific measures concerning work that falls within one or more of the categories listed in Schedule 3:</td>
</tr>
<tr>
<td></td>
<td>1. Work which puts workers at risk of burial under earthfalls, engulfment in swampland or falling from height.</td>
</tr>
<tr>
<td></td>
<td>2. Work which puts workers at risk from chemical or biological substances constituting a particular danger to the safety or health of workers or involving a legal requirement for health monitoring.</td>
</tr>
<tr>
<td></td>
<td>3. Work with ionizing radiation requiring designation of controlled or supervised areas.</td>
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<tr>
<td></td>
<td>4. Work near high voltage power lines.</td>
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<td></td>
<td>5. Work exposing workers to the risk of drowning.</td>
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<tr>
<td></td>
<td>6. Work on wells, underground earthworks and tunnels.</td>
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<tr>
<td></td>
<td>7. Work carried out by divers having a system of air supply.</td>
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<tr>
<td></td>
<td>8. Work carried out by workers in caissons with a compressed air atmosphere.</td>
</tr>
<tr>
<td></td>
<td>9. Work involving the use of explosives.</td>
</tr>
<tr>
<td></td>
<td>10. Work involving the assembly or dismantling of heavy prefabricated components.</td>
</tr>
</tbody>
</table>
CPCS (CONSTRUCTION PLANT COMPETENCE SCHEME) Provides skills cards for the plant sector of the Construction Industry. It is recognised by the UK Contractors Group (UKCG) and Major Home Builders Group (MHBG), amongst others, as the preferred card to comply with codes of practice for competence and certification. CPCS is owned by the Construction Industry Training Board (otherwise known as CITB).

COST LIFE INDEX The cost (in this case of a Grouted Macadam) expressed as the cost per square metre divided by the service life.

DESIGN LIFE The period of time during which the item is expected by its designers to work within its specified parameters; in other words, the life expectancy of the item. It is the length of time between placement into service of a single item and that item’s onset of wearout.

DURABILITY Ability of a product to maintain its required performance, under the influence of foreseeable actions, for a reasonable economic working life.

GROUTED MACADAM SURFACING An alternative to traditional surfacing materials providing impervious finishes with an extended design life, comprised of an open-graded macadam flooded with either an Asphaltic or Cementitious Grout.

HAPAS (or equivalent) AGREED METHOD STATEMENT The Method Statement for the Installation and Quality Control of Grouted Macadams for Highways that has been agreed in order to maintain the Contractor’s certification to HAPAS (or equivalent).

HAPAS (or equivalent) AGREED QUALITY PLAN The Assessment of Production Quality Plan for Grouted Macadams that has been agreed in order to maintain the Contractor’s certification to HAPAS (or equivalent).

HAPAS Highway Authorities Product Approval Scheme – an approval scheme for innovative products and systems used in highway works.

HEALTH AND SAFETY FILE As defined in The Construction (Design and Management) Regulations 2015: The information manual for handover at the end of the project. Will remain with the Client and serve as a health and safety reference during the life span of the completed project. It must contain relevant information about the project which should be taken into account when any construction work is carried out on the building AFTER the current project is finished. Information included should only be that which is needed to plan and carry out future work safely and without risk to health. NOTE: A health and safety file is only required for projects involving more than one contractor.

JOINTS Longitudinal or transverse lengths along or across the pavement surface where individual layers of surfacing meet or overlap.
MASK An adhesive barrier tape or other similar material used to cover ironworks, kerbs, gullies etc to prevent contact with the surfacing during installation such that after removal these objects remain free from aggregate materials or grout and in full working order.

MIX DESIGN A laboratory process for determining the optimum combination of mixture components necessary to achieve the desired level of in-service performance.

NATIONAL VOCATIONAL QUALIFICATIONS (NVQs) Work based awards in England, Wales and Northern Ireland that are achieved through assessment and training. In Scotland they are known as Scottish Vocational Qualification (SVQ).

OPEN GRADED SURFACE COURSE An aggregate mixture with very few fines, creating a permeable finish.

PATCH TEST A standard test for measuring the texture depth of road surfaces.

PAVING MACHINE Purpose built vehicle used for laying surfacing materials.

PLANING (COLD MILLING) A machine cutting process that removes construction materials in individual layers, whilst simultaneously granulating them into a reusable secondary aggregate.

POLISHED STONE VALUE (PSV) A relative measure of the extent to which different types of aggregate in the surface course will polish under traffic.

PRINCIPAL CONTRACTOR As defined in The Construction (Design and Management) Regulations 2015: A person appointed by the Client as the Principal Contractor where there is more than one contractor, or if it is reasonably foreseeable that more than one contractor will be working on a project at any time. NOTE: The Client must appoint the Principal Contractor in writing.

PRINCIPAL DESIGNER As defined in The Construction (Design and Management) Regulations 2015: A person appointed by the Client as the Principal Designer where there is more than one contractor, or if it is reasonably foreseeable that more than one contractor will be working on a project at any time. NOTE: The Client must appoint the Principal Designer in writing.

QM An abbreviation for Quality Management

QUALITY MANAGEMENT Quality Management, or QM for short, is the systematic monitoring and evaluation of the various aspects of an operation to maximize the probability that consistent standards of quality are being attained.

REGISTRATION / CERTIFICATION TO A RECOGNISED STANDARD Awarded to a contractor by a UKAS accredited certification body to indicate that agreed standards are being attained.

REGULATING Re-profiling the existing road surface prior to surfacing in order to remove any unacceptable defects such as ruts or potholes.
| **ROLLER** | Mobile plant/equipment used to compact layers of surfacing materials. |
| **RSTA** | The Road Surface Treatments Association is the trade body representing the road surface treatments industry. [www.rsta-uk.org](http://www.rsta-uk.org). |
| **SERVICE LIFE** | The lifetime, or the acceptable period of use in service. |
| **SRV** | Skid Resistance Value |
| **UNITED KINGDOM ACCREDITATION SERVICE (UKAS)** | The sole national accreditation body recognised by the British government to assess the competence of organisations that provide certification, testing, inspection and calibration services. |
### 9 APPENDIX C – References

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS 594987:2015</td>
<td>British Standard for Asphalt for roads and other paved areas – Specification for transport, laying, compaction and product-type testing protocols.</td>
</tr>
<tr>
<td>BS EN 13043:2002</td>
<td>European Product Standard for Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas.</td>
</tr>
<tr>
<td>CDM</td>
<td>Construction (Design and Management) Regulations 2015.</td>
</tr>
<tr>
<td>Design Manual for Roads and Bridges (DMRB)</td>
<td>Highways England Design Manual for Roads and Bridges (DMRB) contains information about current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads, including motorways.</td>
</tr>
<tr>
<td>GS6</td>
<td>HSE Guidance Note 6 – Avoiding Danger from Overhead Power Lines.</td>
</tr>
<tr>
<td>Interim Advice Note (IAN) 54</td>
<td>Highways England Revision of SHW Clause 903, Clause 921 and Clause 942. It should be read in conjunction with the relevant parts of both the Design Manual for Roads and Bridges and the Manual of Contract Documents for Highway Works.</td>
</tr>
</tbody>
</table>

VOLUME 1: Specification for Highway Works (Series 900)

VOLUME 2: Notes for Guidance on the Specification for Highway Works

National Highway Sector Schemes are bespoke management schemes within an ISO9001:2008 framework. Each scheme is managed by a separate technical advisory committee made up of representatives from across the sector, regulated by UKAS.

NHSS SECTOR SCHEME 12A / 12B: For static temporary traffic management on motorways and high speed dual carriageways including on-line widening schemes.

NHSS SECTOR SCHEME 12C: For Mobile Lane Closure Traffic Management on Motorways and Other Dual Carriageways.

NHSS SECTOR SCHEME 12D: For Installing, maintaining and removing temporary traffic management on rural and urban roads.

NHSS SECTOR SCHEME 16: For the Laying of Asphalt Mixes.


TRAFFIC SIGNS MANUAL – CHAPTER 8: Traffic Safety Measures and Signs for Road Works and Temporary Situations - Published for the Department for Transport under licence from the Controller of Her Majesty’s Stationery Office.

THE WELL-MAINTAINED HIGHWAYS – CODE OF PRACTICE FOR HIGHWAY MAINTENANCE: Published by Her Majesty's Stationery Office.