



CODE OF PRACTICE FOR UNDERTAKING VELOCITY PATCHING



RSTA Code of Practice for Undertaking Velocity Patching

Foreword

This first edition of the Code of Practice has been produced by the RSTA Velocity Patching Sub-Committee. It has been reviewed in the context of the British Standard BS 434-2: 2006 which includes Velocity Patching within its scope.

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 www.adeptnet.org.UK

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1 PREAMBLE

1.1 General

Velocity Patching is the generic phrase used within BS434-2 to describe the process of using high volume low pressure air to clean the road surface defect, before applying a bond coat of either a hot or cold bitumen emulsion. Aggregate is then propelled, using high volume air at low pressure, before mixing it with the bitumen emulsion moments before it is compacted as it is placed in the ground. The new repairs can then be trafficked immediately after laying. Velocity Patching does not repair underlying road base problems.

To the highway engineer, Velocity Patching offers a fast, efficient and cost-effective way of removing defects; safety hazards; maintaining skid-resistance; preserving and protecting roads against the damaging effects of water. To obtain the best results it is necessary to give careful consideration to a wide range of detail, to plan and design the work carefully. The speed of the Velocity Patching operation and the short duration of time during which motorists are inconvenienced is also an important consideration and advantage on roads carrying high volumes of traffic during peak periods.

The main function of Velocity Patching is to repair defects such as potholes, rutting and edge overrunning, waterproof, re-profile, and to assist in preserving the road surface, to provide texture, skid-resistance and prevent the ingress of water and therefore helping to maximise the service life of the asset, without generating waste material and without causing any further damage to the road base or surrounding area. We do need to add a list of the type of defects it can be used to repair.

A useful way of comparing the effectiveness of Velocity Patching or other maintenance techniques is to express it in terms of a 'cost life index'. This is the cost per square metre of the work divided by the satisfactory life in years. It provides a measure of the "value for money" which the highway authority is achieving. A low 'cost life index' and "high value for money" is the result of high-quality work.

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

The Velocity Patching Process is regulated by BS 434-2 2006 and National Highway Sector Scheme 13 (NHSS13). There is also a CSCS card for Velocity Patching and an apprenticeship, with training available through the Road Surface Treatments Association www.rsta-uk.org.

1.2 Health, Safety and Environment

All those involved in preparing and executing Velocity Patching 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.

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The planning and organising for health, safety and environmental issues must commence as soon as a Velocity Patching programme is envisaged.

The client should employ a competent contractor. It is recommended that the simplest way for a client to achieve this is to select at tender stage contractors accredited to National Highways Sector Scheme 13.

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

It is the appointed Contractor's duty to prepare a detailed Health and Safety Plan for the particular contract of works from the Pre-construction information supplied by the Client. This must itemise the methods to be employed to overcome the specifically identified hazards and risk reduction measures that will be in force on this contract. They must also ensure adequate welfare is provided from the start of the contract.

Once the works commence the Contractor has control of health, safety and environmental matters but liaison with the client, police and the general public on issues of congestion, diversions or closures must be on-going throughout the contract.

The 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. Written specific risk assessments must be prepared which can be used to identify control measures for both physical and chemical hazards. The measures must form the Contractor's safe systems of work which enhance the safe behaviour of the workforce as well as protect 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 work phase. Disposal of waste and protection from spillage and contamination are other considerations when looking at the overall Velocity Patching activity.

1.3 Training

The design of Velocity Patching and its execution is dependent on a wide range of factors and close attention to detail. The quality of the completed installation is dependent upon the skill and care of the operatives.

The National Highway Sector Scheme 13 now defines the minimum qualifications and competency required for all personnel involved in the design, supervision and installation of Velocity Patching. It is the Association's view that a competent qualified workforce is essential to achieving high quality durable repairs. The RSTA runs regular training courses, details of which can be obtained from the RSTA website www.rsta-uk.org/calendar.

Operatives should hold NVQ level 2 and Supervisors NVQ level 3 qualifications plus CSCS cards endorsed by RSTA. Supervisors shall attend the RSTA up-skilling

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training course on Velocity Patching every 5 years and obtain a silver certificate as evidence of maintained competency.

In addition supervisors should demonstrate they are maintaining competency by attending an appropriate industry accredited training course every 5 years. The RSTA run training courses throughout the year on Velocity Patching.

1.4 Quality Assurance

The Road Surface Treatment Association continues its commitment to quality assurance and has been instrumental in producing the National Highway Sector Scheme 13 for the Supply and Application of Surface Treatments to Road Surfaces which includes Velocity Patching within its scope.

The Sector Scheme 13 Document is available on the UKAS website. www.ukas.com.

The RSTA, from whom further details are available, currently chairs the National Highway Sector Scheme 13 Technical Advisory Committee.

1.5 Planning and Co-ordination

Careful and detailed planning before work commences is an essential element of successful Velocity Patching. There should be close co-ordination between contractors and their 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 will proceed and to confirm suitability of Velocity Patching for each site.

Ideally the client officer overseeing the Planning and Co-ordination of the works will have a clear understanding of the Velocity Patching process with its advantages and limitations and will have attended the RSTA Training course on Velocity Patching.

It is in the interests of both contractors and clients that the programme of works flows smoothly from site to site without the need to travel many miles for the purpose of repairing one or two defects on a road.

2 SITE SPECIFIC TRAFFIC MANAGEMENT REQUIREMENTS & SPECIFICATION

Motorway, Dual Carriageways

Consider PSV of aggregate/whether to use a polymer modified emulsion, traffic management, lane closures etc., secondary compaction pre and post sweeping before opening to traffic and timing of works.

Category A & B Roads

The first consideration would be what Traffic Management to put in place whether that be temporary traffic signals, stop and go, or a priority system. The site location will govern what TM design will be most suitable. Consideration should also be given to the aggregate PSV and where the repairs are located i.e. on bends or approaches to side roads or junctions.

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Urban Roads and Footways

Particular care must be taken whilst working in an urban environment for pedestrians and vehicles, the provision of Traffic Management, masking of kerbs and shielding of property and vehicles may be required. Thought should also be given to the size of aggregate used on these sites. Where there are low vehicle movements secondary compaction should be considered to 'knit in' and stabilise the top surface of repairs. This will be a necessity for footway work. A blinding application of sand will also be required for footway schemes and in some urban environments where there is a high percentage of foot traffic.

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

Recommendations on the signing and traffic management for Velocity Patching can be taken from "The Red Book" Safety at Street works and Road Works a Code of Practice.

Unclassified roads

If site conditions allow and on completion of the site risk assessment, Traffic Management can be kept to a minimal level with just basic chapter 8 signage.

Before any design, planning or Velocity Patching is undertaken, it is important to identify the lengths of road to be treated and to draw up a schedule. A clearly understandable system such as a line, arrow and job number on the road surface is recommended or location plans detailing which roads are to be repaired. The operators then carry out a find and fix programme of work with details passed to the client of number of repairs and volume of material used.

3 DETERMINING THE SPECIFICATION

3.1 Each site must be considered in the light of its unique characteristics, including the nature of surface, geography, volume and speed of commercial and other traffic using the section of road. The type of material is designed to reflect the end use of the site; the client's needs; application techniques; weather conditions; site preparation and after care. The selection and compatibility of the correct materials and application rates of material is as important as the design of other engineering works.

3.2 The design considerations of Velocity Patching are particularly important in order that the treatment applied to the road surface is right for the circumstances in which it has to operate and the job it has to do. Site inspections will help to determine the specification, i.e. aggregate PSV, binder type and content, required technique, machine type, should the repairs be raked in, screened with dry aggregate, sand, or be rolled, treated with a pad coat to prepare for surface dressing and are they required as a temporary or permanent repair.

Velocity Patching Machine Selection is also an important consideration for the following as not all machines types available in the market may be suitable for all types of work.

3.3 The Highways Agency has agreed to include Velocity Patching within Clause 946, Patching and Repairs to Potholes and Depressions (Including Emergency Patching), in the Manual of Contract Documents for Highway Works (MCHW) Volume 1 Specification for Highway Works, available on-line at www.dft.gov.uk/ha/standards/mchw/index.htm.

4 SITE INFORMATION

The client determines the program of work and the contractor decides on a site by site basis whether the process is suitable. If for whatever reason the process is unsuitable the contractor will consult with the client.

Information required from client for Traffic Management purposes will include the following;

4.1 Traffic flow data

This will include such factors as high peak hour flows, high percentage of LGV's etc

4.2 Road Layout

This will identify the type of road under consideration e.g. whether it is an 8 metre wide main road with or without major junctions, or a single lane width country lane.

It is important that the client in charge of Velocity Patching programme fully understands the Velocity Patching Process and the type and extent of the work required. One way of achieving this is the preparation of a schedule and maps indicating TM requirements for the sections of road to be treated, the length and an approximate number of cubic metres of material that will need to be laid, location of material storage area – The Information Sheet is usually provided following an assessment by either a suitable experienced member of the client or the contractor.

5 PLANNING AND EXECUTION

5.1 Type of Control

The information from 4.1 and 4.2 will give the input necessary to decide the general type of traffic control required, e.g. restricted working hours, maximum site length, availability of alternative routes, advance public warning required. Narrow lanes may require to be temporarily closed or advance warning of delays given.

5.2 Stop and Go signs

The operators of these signs hold the appropriate qualification to operate the stop and go system, be in two way radio communication with one another and one of the operators should be nominated to have overall control of the traffic flow arrangements.

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On roads where it is not possible to provide the desirable sideways safety zone between the plant/operatives and moving traffic, the speed of the passing traffic should be restricted to a maximum of 10 m.p.h.

5.3 Traffic Regulation Orders (TRO's)

This is a legal process to allow the closing of roads or imposing a mandatory speed limit and needs to be arranged well in advance of the planned works by the local highway authority.

5.4 Road Markings

Where junction markings are going to be obliterated by Velocity Patching the client must be informed so that the appropriate warning signs can be provided until such a time when the road markings are replaced.

5.5 Loose Chipping Signs

In general sites highlighted for Velocity Patching could have repairs scattered throughout its length and alternatively long sections without any repairs carried out. For this reason the sites will have loose chipping signs erected at each end of the site, on the entry to the site from any side roads and repeated throughout the site where required with particular attention being paid to inclines and bends.

5.6 Sweepers

Generally Velocity Patching does not require pre or post sweeping however in certain applications it may be required e.g. on unclassified roads, motorways and other high speed roads, on approaches to bends, junctions and inclines on major roads and where a small amount of loose aggregate could endanger the travelling public. This will be risk assessed in the planning stage of the proposed works, and at site inspections after the repairs have been completed.

5.7 Rollers

Generally Velocity Patching Process negates the need for secondary compaction however due to the wide variances in machines, and the materials used the contractor should be consulted. As in 5.6 [above] this may be required in the same circumstances to knit in the top surface of the repairs prior to removing the traffic management.

5.8 Blinding off with sand

In certain circumstances the repairs will need to be blinded off with sand or racked in with a smaller aggregate to stop the bitumen emulsion being picked up e.g. footway schemes that will have pedestrian traffic immediately after the repairs are carried out, in urban environments again where there is likely to be pedestrians coming into contact with newly laid repairs. It would also be advisable to blind off repairs carried out on high speed roads. Weather, humidity, air and road temperature and binder type will also dictate if blinding off is required.

In addition to compiling the site information, the person supervising the treatment may need to decide which size or type of Velocity Patching machine to use.

5.9 Safety Zones

Consideration must be taken at the design stage due to plant size and equipment, to achieve minimum safety zones according to Traffic Signs Manual Chapter 8 and a risk

assessment approach adopted.

5.10 Temporary Diversions

Temporary diversions should not be introduced casually and will involve consultations between contractors and the highway authority. Refer to RSTA/ADEPT Code of Practice for Signing at Velocity Patching Sites (under development). Legal processes often need to be followed to arrange closures or diversions.

5.11 Publicity

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, the number of vehicle movements transporting materials to the site. Leafleting the public and street notification/signing in advance will help to inform the public of intended works and hopefully minimise criticisms.

6. CONTROLLING MATERIAL INSTALLATION

The areas to which Velocity Patching is to be applied shall be clearly defined by the Customer's Engineer (the Purchaser) prior to commencement of the installation work on-site.

The client usually stipulates the guidance for the type of work to be carried out, this being;

- 1 Repairing the defect only.
- 2 Repairing the defect plus and preventative or preservation work.
- 3 Both of the above can include small scale re-profiling, i.e. utility joints that may have settled.

The contractor should be able to demonstrate that the machines have been regularly serviced and maintained to ensure consistent material application rates and material quality control procedures are in place.

The surface to be treated should be in a clean condition prior to Velocity Patching work commencing. The contractor will use his experience to use whatever means deemed necessary to ensure adequate surface preparation prior to installation to ensure good adhesion.

In advance of Velocity Patching on carriageways all temporary materials e.g. deferred set macadams containing soft binders, must be removed as specified by the Customer's Engineer (the Purchaser).

Where Velocity Patching is to be carried out on thermoplastic road marking e.g. at edges lines, these should be removed as bitumen emulsion does not adhere to thermoplastic.

If carrying out repair around ironwork in the carriageway it should be masked.

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Velocity Patching can be used to regulate where necessary. Transverse regulating and carriageway shaping can be carried out over the length of the site as directed or agreed by the Customer's Engineer (the Purchaser).

Weather Conditions

Velocity Patching machines generally use either 60 or 70 % bitumen based bond coats, applied either hot or cold. As a general rule these should be applied when the road temperature is 5°C and rising and below approximately 45°C depending on the binder being used. Some manufacturers produce both polymer and non-polymer modified winter and summer blends therefore it is vital that you check with either the material supplier or contractor for their installation guidelines and recommendations should be followed.

Road surface temperatures are recorded daily am and pm on the Velocity Patching site and if the weather is variable, during the Velocity Patching installation process. The ambient and road surface temperatures together with relative humidity are used to ensure the appropriate Velocity Patching/repair guidelines are followed. The ambient weather conditions are recorded on the Laying Record.

Velocity Patching can be carried out in damp conditions but not during rain, standing water will be either blown away using the machines high volume air or swept from defects prior to repairs taking place. Velocity Patching can be installed on a damp substrate subject to the appropriate ambient and road surface temperatures together with relative humidity criteria being met.

If a section of the Velocity Patching is affected by inclement weather conditions during installation then the Customer's Engineer (the Purchaser) shall be notified. A joint inspection may be required to assess the affected area. If expecting rain, only work on higher volume traffic sites and do not do repairs with a large surface area.

7. INSTALLATION

Velocity Patching produces material in a continuous controlled operation. It is strongly recommended that Velocity Patching should only be installed by operatives and supervisors should satisfy the requirements of 1.3.

All the materials required for the Velocity Patching process are delivered and stored in appropriate convenient locations close to the site. Material requisitions are raised and records are retained on the project file in accordance with the Installers ISO9001 Quality Control System and NHSS13

7.1 System Installation Procedure

High Volume air is used to remove all dust and debris from the area to be repaired.

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The Bitumen emulsion bond coat should be introduced into the air stream enabling it to be forced into every crack and crevice to improve the adhesion of the bond coat while at the same time sealing the repair and the road base from further water damage.

The bitumen emulsion and an approved aggregate are mixed, then immediately compacted into the void at high velocity. The new material is keyed into the existing surface. The repair can be opened to traffic immediately.

- a) The delivery and mixing of the materials is carried out on site with the Velocity Patching Machine.
- b) The materials are mixed in a controlled manner at the nozzle base at the end of the delivery hose and delivered at high speed onto the road surface by high volume air.

7.2 Installation Checks by the Installer.

The installer as part of his quality control procedures carries out the following checks:

Aggregates: Check delivery tickets, visually inspect the material as described in the quality plan.

Emulsion: Check delivery tickets, visually inspect the material as described in the quality plan, take a sample for reference in case of doubt.

A suitable onsite material test to be carried out for each new load of aggregate and emulsion prior to it being loaded on the machine to ensure compatibility and consistency of the mix.

The results of these tests will be recorded on the daily work sheet.

Recommended application rates of litres of emulsion used per cubic metre of material must also be recorded and be within the guidelines given for the chosen aggregate or aggregates used.

The Velocity Patching Contractor must be able to provide evidence of an “on site” material test to confirm cohesive strength.

7.3 Maintenance and Repair

Contributory factors for repair failure;

- Incompatible material selection
- Operatives not trained and competent
- Repair mixture outside of specification
- Inclement weather immediately after application
- Incorrect Process Selection
- Road and Air Temperatures too high or low

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- Quality control checks not carried out
- Aggregate contamination either on delivery or once delivered
- Binder outside of specification
- Lack of compaction where required.

8 TRAFFIC MANAGEMENT

Velocity Patching machines that have a driver and an operator are viewed to provide a safe operation, however they will still require appropriate traffic control and signage as and when appropriate.

It is the view of the RSTA that Velocity Patching machines that can be operated from the driver seat should only be used within a road closure.

It is customary for the local authority or main contractor, to provide the traffic management.

In undertaking Velocity Patching 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.

It must always be remembered that the needs of any site should be considered as unique and each Velocity Patching crew should contain properly trained personnel. For specific sites, a proper risk assessment should be undertaken by an appropriately trained person and acted upon before Velocity Patching equipment and operatives are dispatched to the site. At some sites, this will require discussion between the contractor and representatives of the highway authority 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 National Highway Sector Scheme 13 document details the minimum training and qualification requirements.

The correct selection of traffic management system to be adopted is important. The public should not be unduly inconvenienced by detours or long delays, or the reputation of Velocity Patching as a fast efficient and economic process is put at risk. When considering traffic management arrangements, the following factors need to be taken into account:

(a) Traffic flow data

This will include such factors as high peak-hour flows, high percentage of HGVs etc.

(b) Road layout and junctions

This will identify the type of road under consideration e.g. whether it is a 7.3 metre wide single carriageway principal road with no major junctions, or a narrow country lane.

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(c) Type of control

The information from (a) and (b) above will give the input necessary to decide the general type of traffic control required, e.g. restricted hours of working, maximum working lengths, availability of alternative routes, level of advance publicity needed, etc. Narrow country lanes, for instance, may need to be temporarily closed or a warning of delays may need to be given.

(d) Specification

Both the specification for the work and the job sheet for the site should state any exceptional requirements for dealing with traffic.

(e) Traffic regulation orders

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.

(f) Publicity

Road users do not like being delayed and will take alternative routes if they are given adequate information. As Velocity Patching 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. Nevertheless, principal roads carry many thousands of vehicles per day. 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

- 1) The display of information boards at each site saying, for example, that Velocity Patching is to be carried out and when.
- 2) The distribution of letters to all dwellings and premises and also attached to all 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.

(g) Traffic control and signing

For the safety of drivers, pedestrians and operatives, traffic passing over newly treated roads, or alongside Velocity Patching that is in progress, must be properly controlled. Such control includes adequate advance warning of the works, regular reminders throughout the site of the risk of loose chippings and the proper management of vehicles by the use of traffic lanes. Some instructions such as "stop" and "give way", are indicated both by carriageway markings and by mounted signs. When these carriageway markings are covered by Velocity Patching, it is important to replace them as soon as possible or to provide some temporary signs during the period between the covering of the markings and their permanent replacement. This is particularly important at junctions with high-speed roads.

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Where one-way traffic is operated using stop and go signs, 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 Velocity Patching plant/operatives and moving traffic, the speed of traffic past the works should be restricted to a maximum of 20 m.p.h.

Where road junctions are treated, which result in the obliteration of "stop" and "give way" markings on the carriageway, the appropriate warning signs should be provided (sign 7012 - the Traffic Signs Regulations and General Directions 2002).

Some highway authorities use mandatory speed limits to control traffic speeds when Velocity Patching main roads. 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 council 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 fourteen days, which is normally far longer than is necessary for Velocity Patching 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.

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.

(h) Signs

Unless the Highways Agency has given approval in writing to the use of a sign not included in the Traffic Sign Regulations and General Directions 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 highway authority, the use of the correct signs located in the correct positions is likely to be taken into account by the courts.

9. ROAD PREPARATION

If the site is not too dirty the high velocity air from the machine will clean dust and debris from the site prior to application. If the site is in a rural area it may have heavy deposits of spoil build up. In this case other means of site preparation will be required. This can be carried out with a mechanical loading shovel followed by a mechanical

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sweeper for really heavy deposits or just a mechanical sweeper for moderate deposits.

Also any temporary repair materials (depot stock/deferred set) placed in defects prior to Velocity Patching taking place should be removed as some of these materials are too soft and any Velocity repair material laid over these may sink into the temporary repair.

Velocity Patching will not add any structural strength or repair a damaged road base, it will however help to stop further ingress of water and may arrest further damage and subsidence being caused.

10 BINDERS

Binders used for Velocity Patching are predominantly cationic bituminous emulsions in nature and comply with the requirements of BSEN 13808:2005. Polymer modified binders can be used if the contractor feels he needs a higher level of performance, particularly on high stressed sites or for less embrittlement. Some emulsions are available in summer and winter grades.

Consideration should be given during the planning stages of the program to traffic volumes, road type, skid resistance requirements, weather, and future resurfacing plans as these may all affect the binder selection.

11 AGGREGATES

Aggregates used comply with BSEN13043 and are selected dependent on end use, in particular the site's psv requirements.

The designer of the Velocity Patching asphalt mixture shall select suitable aggregate sources and sizes to ensure installed product meets the requirements of the contract.

12 ROLLERS AND ROLLING

Rolling is not normally necessary as material compaction is part of the process however it may be required depending on the type of Velocity Patching Machine and or materials used, the worksite, or location and techniques chosen.

The Quality Plan shall state whether rolling is required for that product laid on that particular class of road or footpath to ensure the correct finish and a durable product.

The rollers used for Velocity Patching are normally a small single drum roller without vibration so not to crush the aggregate. However, the best type of roller for a newly laid Velocity Patching repair is the passage of slow-moving vehicle tyres. Heavy steel-wheeled rollers can cause crushing of aggregate, thereby reducing the size and accelerating the loss of texture. For this reason, they are not normally recommended.

Pneumatic tyred rollers (PTRs), being multi-wheeled, are also ideal.

13 SURFACE PREPARATION SWEEPERS AND SWEEPING

Road preparation is important to avoid de-bonding failures. Mechanical sweepers are used to clean the road surface before Velocity Patching is carried out. In extreme conditions such as heavy soiling additional measures may be required. They are also used as a means of collecting any loose chippings after an extensive number of repairs have been completed or in sensitive areas.

Loose chippings larger than 6 mm can cause vehicle damage and should be removed as soon as possible following treatment.

14 ALL PLANT

The noise 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 hearing protection, where necessary. All plant and vehicles should be adequately maintained with regular inspection reports available.

15 METHOD OF WORKING

The Velocity Patching Machine size and type is of major importance in assessing the following, due to the varying machine configurations available in the market. It is the view of the RSTA that Velocity Patching machines that are can be operated from the driver seat should only be used within a road closure and further special care must be taken when using trailer mounted units.

On single carriageway trunk and principal roads, Velocity Patching falls into the category of "mobile works". Under this type of working, traffic will be controlled by the use of stop and go signs as described in Section 8. The length subjected to this operation should be kept as short as possible consistent with safety requirements. 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.

Most contractors prefer to operate in the same direction as normal traffic movement. The decision on the direction of travel to be adopted will depend upon such factors as the speed of traffic and the visibility available. The direction of operation selected should form part of the risk assessment for each particular section of road.

On minor roads, a decision will be required at the initial planning stage as to whether or not the road is to be treated in one pass. The direction of working under these circumstances is probably not important.

Where the whole width is not to be treated in one pass and one way traffic operation past the Velocity Patching 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 2.5.1.6 of chapter 8 of the Traffic Signs Manual. Where these widths are not available, the interests of safety

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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. However due to the speed of the process, mobility of the machine and anticipated traffic it may be possible to move the machine to the nearest parking place to allow traffic to pass. Where a road is to be temporarily closed to allow Velocity Patching operations to be carried out safely, proper contingency arrangements must be made to allow for the passage of emergency vehicles.

Additional advice is given in the RSTA/ADEPT Code of Practice – Traffic Management of Velocity Patching (under development).

This covers single carriageway roads:

- a) Over 7.3m wide
- b) 6.0m – 7.3m wide
- c) Under 6.0m
- d) After completion of treatment, prior to final sweeping and relining.

16. AFTERCARE

The machine type and material selection, weather conditions and traffic volumes will have a dramatic effect on loose chippings and debris which may need to be removed by the operatives or by sweeping. Site sweeping depends on the site circumstances and is linked to the number & size of repairs, location, weather conditions, type of materials used, traffic volumes. The contractor and client need to agree in advance who is responsible for organising the sweeping and removal any of loose chipping signs. Loose chipping signs should remain on site until it is deemed safe to remove them this would normally be within 3 days. Client is responsible for reinstating road markings where applicable.

Traffic control is also a vital element of aftercare. On main road sites and points of particular stress, it is essential that traffic control should remain in place until such time as the treatment has developed adequate cohesive strength, e.g. 1-2 hours (more than that is impractical & unenforceable).

17 QUALITY ASSURANCE

Membership of the Road Surface Treatment Association is available to contractors who have third party quality assurance (BSEN ISO 9001) for the type of Velocity Patching work they undertake. The unanimous decision of the Association is to adopt this principle as an indication of its commitment to quality in all its undertakings. The setting up and maintenance of a quality assurance system represents a substantial financial commitment to member companies. Those costs will inevitably have been reflected in the unit prices tendered for Velocity Patching. Velocity Patching contractors who are not members of the RSTA and have not invested in quality assurance may therefore be in a position to offer lower contract rates, but it follows that their work may well be of a lower quality than that carried out by RSTA member contractors.

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Quality controlled RSTA member companies need much reduced supervision by highway authority representatives and should decrease the call for tests and checks on machinery and workmanship which form part of a quality assurance system.

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

“Well Maintained Highways”, the Code of Practice for Highway Maintenance encourages requirements for Quality Assurance and ADEPT recommends that its members have specifications which require registration under the relevant Sector scheme.

The National Highway Sector Scheme 13 was revised and published in May 2011 and now contains Velocity Patching within its scope.

The NHSS13 document, which is available on the United Kingdom Accreditation Service (UKAS) website www.ukas.com, is actively supported by RSTA Members most of whom have or are gaining accreditation against the scheme as their Quality Assurance registration is reviewed and updated.

APPENDIX A

CHECK LISTS

Pre-Contract Checklist

Has the contract programme been agreed and all relevant notifications put in place.

- 1 Has the contractor all relevant site information i.e. location of schools, bus route, market days, events etc?
- 2 What type of traffic control is to be operated and is there enough labour to carry out the works in a safe and proper manner?
- 3 Have all labour received the appropriate training?
- 4 Has the correct and adequate plant been allocated as required under the contract?
- 5 Are the materials specified under the contract available when required?

Site Checklist

- 1 Has the road been swept if required?
- 2 Is the road clear of parked vehicles or any other obstructions?
- 3 Are the correct signs in place?
- 4 Are the operatives all present and correct and wearing the relevant Personal Protection Equipment?
- 5 Is all the plant present and in safe working order?
- 6 Are there enough materials available, in good condition, at the correct storage area?
- 7 Are the weather conditions appropriate to commence work i.e. check forecast daily for high humidity levels, air temperatures and rain?
- 8 Is the planned method of operation safe, both to the operatives and the public?
- 9 What type of traffic control is to be implemented and does everybody understand the method of operation?

Post Contract Checklist.

- 1 Have arrangements been made for post-contract inspections and any required further sweeping?

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- 2 Are signs being maintained in a satisfactory condition and placement and removed when required?
- 3 Is the required contract information being collected and documented?
- 4 Are re-inspection arrangements clear and agreed?

APPENDIX B

GLOSSARY OF TERMS

ADEPT

Association of Directors of Environment, Economy, Planning and Transport, previously known as the County Surveyors Society (CSS).

ADHESION

The property by means of which a binder sticks to the surface of a solid body, e.g. the road or chippings.

AGGREGATES

Aggregate from mineral sources which has been subjected to nothing more than mechanical processing and which has a particular grading.

AGGREGATES STORAGE AREA

A suitable hard standing for storing graded aggregate.

APPLICATOR

A purpose built Velocity Patching machine.

BINDER

Material serving to coat the particles of an aggregate and to assure its cohesion. The binder component of Velocity Patching is a bituminous emulsion which may be modified with polymer or other additives.

BINDER CONTENT

Difference between 100% and the percentage water content determined in accordance with BS EN 1428. (BS434-2).

BITUMEN

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.

BITUMEN - MODIFIED

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

RSTA Code of Practice for Undertaking Velocity Patching

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. In Velocity Patching modified bitumens are employed in the form of emulsions.

BITUMEN – EMULSION

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

BOND

The adhesion between the Velocity Patching material and the underlying substrate.

BREAK (EMULSION)

The coagulation of the dispersed bituminous phase of an emulsion when in contact with mineral aggregate.

BSI

British Standards Institution.

BSEN 13808:2005

A Framework product standard for specifying cationic road emulsions.

BSEN 13043:2002

European Product Standard for Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas.

CATIONIC BITUMEN EMULSION

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.

MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS (MCHW) VOLUME 1 SPECIFICATION FOR HIGHWAY WORKS SERIES 900

Road pavements – bituminous bound materials.

COST LIFE INDEX

The cost (in this case of Velocity Patching) expressed as the cost per square metre divided by the service life.

DURABILITY

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

JOINTS

Longitudinal or horizontal lengths along or across the pavement surface.

LAYING RECORD

A documented record providing details of the Velocity Patching process as laid.

MASK

An adhesive barrier tape or other similar material used to cover cat's eyes, road ironwork, etc to prevent contact with the Velocity Patching material during installation such that after removal these objects remain free from contamination and in full working order.

MIX DESIGN

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

NVQ

National Vocational Qualifications (NVQ's) are work based awards in England, Wales and N.Ireland that are achieved through assessment and training. In Scotland they are known as Scottish Vocational Qualification (SVQ).

To achieve an NVQ, candidates must prove that they have the ability (competence) to carry out their job to the required standard. NVQs are based on National Occupational Standards that describe the 'competencies' expected in any given job role. Typically, candidates will work towards an NVQ that reflects their role in a paid or voluntary position. For example someone working in an admin office role may take an NVQ in Business and Administration. There are five levels of NVQ ranging from Level 1, which focuses on basic work activities, to Level 5 for senior management.

POLISHED STONE VALUE (PSV)

A relative measure of the extent to which different types of aggregate in the surface course will polish under traffic.

PTR

An abbreviation for pneumatic tyred roller used to compact Velocity Patching materials to achieve a denser more durable finish.

QA

An abbreviation for Quality Assurance.

QUALITY ASSURANCE

Quality assurance, or QA for short, is the systematic monitoring and evaluation of the various aspects of a Velocity Patching operation to maximize the probability that minimum standards of quality are being attained by the production process.

Registration to BSEN ISO 9001 given to a contractor by a certification body indicates minimum standards are being attained.

ROLLER

Mobile plant/equipment used to compact Velocity Patching materials.

RSTA

The Road Surface Treatments Association is the trade body representing the road surface treatments industry. www.rsta-uk.org

SECTOR SCHEME

National Highway Sector Schemes are bespoke management schemes within an ISO9001:2000 framework. Each scheme is managed by a separate technical advisory committee made up of representatives from across the sector, regulated by UKAS.

THERMOPLASTIC

A term used to describe the materials used in most road markings.

TRAFFIC SIGNS MANUAL

Regulatory guidance on the use of traffic signs at mobile works. Traffic Signs Manual Chapter 8: Traffic Safety Measures and Signs for Road Works and Temporary Situations.

UKAS

National Measurement Accreditation Services.

APPENDIX C

REFERENCES

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