Road Emulsion Association Limited

Technical Data Sheet No.12

Miscellaneous Uses of Bitumen Emulsions

Revised by the Association's Technical Committee - August 2025

1. Introduction

The intent of the REA Technical Data Sheets is to describe the detailed uses of bitumen emulsion in the road maintenance and construction industry. Most uses involve the production of emulsions specifically designed for the requirements of individual processes such as rapid-breaking emulsions for surface dressing and medium-breaking emulsions for bituminous mixtures.

This data sheet covers some additional uses of emulsions which have relevance in road construction and civil engineering but are not necessarily related to trafficked surfaces. The list of examples is by no means complete but it does illustrate the impressive versatility of bitumen emulsions.

2. Asphalt Preservation

The service life of bituminous surface courses suffering from oxidation can be economically extended by the application of proprietary preservation emulsions when applied at the appropriate time.
These modified emulsions are formulated with low viscosity to penetrate cracks and interstices, sealing and waterproofing the surface while having a minimal effect on texture depth and leave a tack-free surface.
Application is normally by spray tanker to carriageways and car parks, and by hand to smaller areas such as footpaths and driveways. Advice on rates of application and use are provided by individual suppliers.

3. Joints in Pavement Courses

Stable and watertight joints can make an important contribution to the long-term performance of a flexible pavement. They help to keep water out of the structure and reduce the risk of fretting along the joint.
The Specification for Highway Works (Clause 903 [1]) recognises that cold-applied bitumen emulsions can be used instead of hot bitumen to coat the vertical face of longitudinal and transverse joints in surface courses, and that polymer modified emulsions can be applied as a sealant to the top surface of all base and binder course joints. BS 594987 [2] also permits the use of cold applied thixotropic bitumen compounds (modified bitumen emulsions) as an alternative to hot bitumen for coating the vertical face of joints, manhole covers, kerbs, concrete channels and similar projections.

The advantages of the use of cold applied products instead of hot bitumen include:

(a) No heat is required, reducing the cost of plant and fuel.

(b) Safe and easy application; the hazards associated with the use of a hot material are eliminated.

(c) Small areas can be dealt with quickly; no need to wait for the bitumen heater to heat up before work begins.

(d) Easier to transport; no need to wait for the bitumen heater to cool down before it is moved.

The use of specially formulated bitumen emulsions for joint painting is firmly established in the UK.

4. Filling Surface Cracks

Polymer modified bitumen emulsion can be an effective material for sealing cracks in pavement surfaces. They provide a way of taking prompt corrective action before the underlying road structure is affected by moisture and detritus.
A number of bitumen emulsion-based compounds are available with the skid resistance characteristics needed for use on the surface of a public highway.

5. Protection of buried concrete and ironwork

Emulsions are used for the protection of exposed or buried concrete and ironwork. In order to impart more 'body' to the emulsion and to strengthen the surface film, polymer modified emulsion is normally used.

6. Slip-Coat

Emulsions are often used to create a bitumen membrane between the base and upper layers of a concrete slab pavement. This stops rigid adhesion between layers of different ages and strengths, allowing them to mature without setting up internal stresses. The slip coat also helps to retain the strength of the lower layer by preventing water seeping into the surface through cracks.
Emulsions of Grade C60B3 or C60BF3 are preferred. The emulsion may be applied in one application at a rate of about 1.8 litres/m^2 or in two applications at a rate of about 0.9 litres/m^2. If two applications are used, it has the added benefit in that the first application can be used as a curing agent for the lower layer, as long as it is allowed to break completely before the second application is made.

7. Prolonging the life of or altering the colour of paved surfaces

Mixtures of fine aggregates and bitumen emulsion can be applied to an asphalt or macadam surfaces to provide a surface seal. These ready mixed slurries are available in containers of various sizes. Part of the aggregate can be replaced by pigment to achieve a variety of colours including grey, red and green.

Several coats may be applied depending on the type of traffic. These materials are normally only applied at paint film thickness and will not be very resistant to abrasive trafficking and scuffing action. However, they provide an economical and colourful means of sealing paved surfaces in low traffic density areas where colour definition and surface renovation is required.

8. Surface Dressing Encapsulation

New and existing Surface Dressings can be treated with proprietary encapsulation emulsions, formulated to 'lock in' the aggregate dressing, reducing or preventing the loss of chippings while increasing stability of the dressing in stress areas.
When applied to old Surface Dressings, these sealcoats arrest the effects of oxidation on the dressing, reducing chipping loss & re-sealing the surface with minimal effect to the existing texture depth.
Aesthetically, these products provide a uniform black appearance similar to a conventional surface course, which can be particularly effective in urban residential areas where Surface Dressing may otherwise be considered unacceptable.

9. Skid Pans

A surface suitable for skid testing is provided by depositing a film of hard bitumen on a smooth surface. This may be achieved very simply by application of a specialised hard grade of emulsion. The emulsion is sprayed evenly on to the surface and dries to a hard shiny surface with a low resistance to skidding. The surface film of bitumen can conveniently be sprayed again if it looses its smooth texture with use.

10. Blowing Sand Stabilisation

Sand dunes and other areas often require treatment to prevent the surface being eroded by wind. The use of an emulsion stabilises the surface to a depth of about 40mm whilst still allowing effective drainage.

The emulsion commonly used is Grade C55B4 or C55BF4. This is diluted with 3-4 times its volume of potable water before it is applied to sand, at the rate between 8.5 and 11.0 litres/m^2. Care should be taken to ensure that surplus bitumen is not left on the surface.

11. Hydra seeding & Grass Growth

In new road construction, it is essential that the grass establishes a root system as quickly as possible to stabilise slopes and other soiled areas.

Bitumen emulsion is a very convenient medium for covering the seed bed with a layer that assists the germination of grass seed in the following ways:

(a) The bitumen layer prevents evaporation of water from the surface and keeps the soil moist.
(b) The 'black' bitumen layer absorbs heat during the day and gives it up slowly each night, creating temperature conditions that encourage germination.
(c) The seed bed is less likely to become waterlogged, blown or washed away, or eaten by birds.

An accepted method of application is as follows:

(i) The seed bed is prepared in the normal way to produce a fine tilth of soil; a good grass seed mixture is applied at the recommended rate and the seed bed is rolled lightly and watered if necessary.
(ii) A layer of clean sharp sand is evenly applied to a depth of about 5 mm.
(iii) Grade C55B4, C55BF4 (or A1-55, A1-60 to BS 434-1) [3] is applied at a rate of about 0.7 litres/m^2.
(iv) The emulsion film is covered with another layer of clean sharp sand to a depth of about 5mm, but not greater than 10mm. This prevents damage in the early stages of grass growth.

There are many other uses to which bitumen emulsion may be put in the civil engineering and constructions industries, and it is hoped that the above techniques will illustrate the scope and variety of possibilities. Member companies of The Road Emulsion Association should be contacted for further information.

12. UKCA/CE Marking

At the end of June 2013, the Construction Products Regulation (CPR) was fully implemented in all EU member states. Since then, Construction products covered by a harmonised European standard (EN) have a legal requirement to be CE marked in order to place them on the European market. The UK withdrew from the European Union in January 2020 and in January 2021 introduced its own UKCA mark. A transition period for

implementation of the UKCA mark was introduced but this period has been extended indefinitely meaning that both CE and UKCA Marking can continue to be used.

References

[1] Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works Series 900 Road Pavements – Bituminous Bound Materials.

[2] BS 594987:2024 Asphalt for roads and other trafficked areas. Transport, laying, compaction and product type testing protocols. Specification

[3] BS 434-1:2011+A1:2016 Bitumen road emulsions. Specification for anionic bitumen road emulsions

For further information see Summary and Reference Sheets on the Association's website www.rea.org.uk

Whilst every care is taken to ensure the accuracy of the general advice offered by the Road Emulsion Association, no liability or responsibility of any kind can be accepted by the Association.