Road Emulsion Association Limited

Technical Data Sheet No.7

Footway Maintenance and Construction Using Bitumen Emulsions

Revised by the Association's Technical Committee - August 2025

1. Introduction

Footways generally carry a lighter loading than carriageways in comparable locations. However, appreciable strength of structure and surface properties are required to withstand the stresses generated by the cross-over of vehicles to access properties or by parked vehicles.

Walkways in urban areas must have adequate stability to high point loading and severe surface stresses. In rural situations an important requirement is for a sound base proofed against the ingress of moisture. However, whatever the situation the quality of construction and level of maintenance significantly affects the long term durability and serviceable life of a footway. Bitumen emulsions fulfil a vital role in all aspects of footway construction and maintenance from the initial sealing of freshly cut formations to the surface treatment of heavily stressed areas.

2. Footway Maintenance

Where the shape is satisfactory, but the surface is slippery or in danger of imminent breakup, surface dressing or slurry surfacing may be employed as a remedial treatment.

2.1 Surface Dressing

Emulsion classes C69B3 or C69BF3, or proprietary footway surface dressing binders are recommended for this surface treatment to seal and/or restore surface texture. It is also proven to be a very effective method of restoring uniformity to an otherwise heavily patched surface. Road Note 39 [1] contains a specific design section on surface dressing for footways and cycleways and should be referred to for specific design criteria. As a general rule emulsion application rates vary between 1.3 l/m² and 1.8 l/m² when 2.8/6.3 or 2/4mm chippings are used.

Over the years, increasing amounts of footway surface dressing has occurred on urban sites, where resistance to bleeding in hot weather and resistance to chippings turning due to surface stresses from traffic cross over points and power steering is required. For this reason, polymer modified emulsion binders are now extensively used in these areas. The success of these dressings depends not only on the specific design criteria employed, but also on control of application. Of particular importance is the application equipment, which must be able to accurately and evenly dispense the binder at the design rate. The need to keep stray binder off fences, walls, kerbstones etc, by use of appropriate masking or specialised application techniques is very important to the success of the installation.

2.2 Slurry Surfacing

Slurry surfacing is composed of fine aggregate and bitumen emulsion in slurry form, which seals cracks, arrests fretting, fills minor depressions and voids and provides a more even and slip-resistant wearing surface. Both slow setting and rapid setting slurries are available

to satisfy varying site and ambient conditions. These materials are generally unmodified bitumen emulsions for footways such as C60B4, B60B5, C60BF4 or B60BF5 although proprietary polymer modified emulsions are increasingly used. It should always be remembered that the finished slurry is a mix of emulsion, aggregate and additives and will require a specific design. Conformity to the design mix is imperative for the success of this process.

Site mixtures are generally batch produced either in concrete bell or purpose designed mixers with the slurry hand applied. In keeping with the mix design, consistency of the mix batch to batch is important for consistency of both appearance and performance of the finished footway surfacing.

3. Footway Construction

There are a number of ways in which footways may be constructed, but whatever method is used it is advisable to follow these basic rules:-

3.1 Formation Seal and Base Treatment

The freshly cut or placed formation and/or freshly laid sub-base should be sealed, with the object of retaining the strength by preserving moisture equilibrium. Bitumen emulsions of class C40B3 or C40BF3, C60B3 or C60BF3 or A1-40, A1-55 and A1-60 to BS 434-1 are used in cold application. Rates of application of 0.9 to 1.4 l/m^2 are recommended (note: actual application rate will depend upon local site conditions as well as the binder content of the material being sprayed).

3.2 Tack or Bond Coat

Where coated Macadam or Asphalt are employed, a tack coat of emulsion should be used between layers to provide an adhesive and dust free surface. The emulsion used for this work should be either Class C40B3 or C40BF3, C60B3 or C60BF3 or the equivalent anionic grades, at a rate of application between 0.4 l/m^2 and 0.6 l/m^2. For higher stressed areas a polymer modified bond coat should be considered.

3.3 Grouting

On sites subject to low stress, it may be economical to prepare a combined base/wearing course by means of application of an emulsion into the interstices of the aggregate, after the latter has been spread on the foundation and compacted, i.e. in-situ grouting.

For full grouting, the emulsion is used to fully coat the aggregate throughout the depth of the material. The emulsion employed should be selected from classes C60B3 or C60BF3, A1-55 or A1-60, the former being preferred in situations where the stone layer is open or wet. C69B3 or C69BF3 may be employed by agreement between the purchaser and supplier. For footway construction, the semi-grout principle is more generally adopted, whereby the emulsion is only intended to penetrate the upper part of the construction, thus providing a limited depth of cohesion and waterproofing. Figures applicable to full and semi-grout are given in Table 1.

To achieve a full grout the quantity of bitumen emulsion should be sufficient to penetrate to the full depth of the course; it is advantageous to apply the emulsion in two stages. For semi-grouted work the quantity of emulsion used should be sufficient to coat the aggregate to the full depth of the layer above the slurry or water-bound layer.

Table 1 - Typical rates of application for grouting

Thickness of Course (mm)	Nominal Size of Aggregate	Full Grout (l/m^2)	Semi-grout (l/m^2)
50	40 mm down	5.5 - 7.0	3.0 - 5.5
65	50 mm down	7.0 - 9.5	4.0 - 7.0
75	50 mm down	9.5 - 11.0	5.5 - 8.0

3.4 Grouting procedure

Following the initial compaction of the support and subsequent application of emulsion, clean 2.8/6.3 mm or 6.3/10 mm chippings should be spread uniformly over the surface in sufficient quantity to fill up existing surface interstices, but not in excess of this. The surface should then be rolled again.

After an agreed interval, a surface dressing should be applied using 2.8/6.3 mm chippings and emulsion selected from class, C69B3 or C69BF3, or a proprietary footway surface dressing emulsion (e.g.C69BP3). The purpose of this dressing is to seal the surface and provide rugosity.

4. Footway Surface Dressing

In the case of surface sealing on a waterbound construction, it may be necessary to apply a double surface dressing, wherein two binder and chipping applications are carried out in quick succession. Emulsion classes C69B3 or C69BF3 or proprietary footway surface dressing emulsions are recommended, and approximate rates of application are as follows:

Single Dressing with emulsion at 1.6 to 1.9 l/m^2 using 2.8/6.3mm chippings.

Double Dressing consisting of a 1st application with 0.9 to 1.4 l/m^2 of emulsion using 2.8/6.3mm chippings, then 2nd application: 0.9 to 1.4 l/m^2 of emulsion with 2.8/6.3mm chippings.

More information on design criteria and application rates can be found in Road Note 39 available from TRL.

5. Footway Reconstruction by Retread

Where a footway has reached a state of disintegration or needs reshaping, it is possible to employ bitumen emulsion as a means of in-situ recycling. The Retread process involves scarifying the existing surface, normally to a depth of 75 mm, importing some fresh aggregate if required to adjust grading, and treating with two successive applications of emulsion. Application rates of emulsion will depend on the nature of the scarified material and must be subject to agreement between Supplier and Contractor. Special attention must be given to the final profile achieved as this is critical to the end user and is often complicated by the smaller nature of the plant employed. Reference should also be made to REA Technical Data Sheet number 10 – The Retread and Regen Processes.

6. 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] Road Note 39: Design Guide for Road Surface Dressing – published by Transport Research Laboratory

For further information on all REA Technical Data sheets please look on the "Technical Datasheets" webpage on www.rea.org.uk