

# Dust Laying with Bitumen Emulsion

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## INTRODUCTION

Dust laying may be used on unsealed granular pavements to reduce dust nuisance, as well as to reduce maintenance costs and loss of pavement material.

This work tip describes the use of bitumen emulsion. Other materials, including various proprietary products, may also be used for dust laying and a more extensive discussion of alternative materials is provided in the ARRB TR report on road dust control techniques (see references).

An advantage of bitumen emulsion, compared to some other materials, is that the bitumen residue remains in the pavement material without leaching and successive applications may be used to gradually develop a lightly bound material.

Dust laying using bitumen emulsion is generally only applicable to low traffic roads (less than about 100 v/1/d), hard standing areas, haul roads and temporary pavements on construction sites.

## BITUMEN EMULSION

### Types

The most suitable emulsion grade for dust laying is generally anionic slow setting (ASS)

although cationic slow setting (CSS) may also be used.

### Dilution

The emulsion is diluted with water prior to use. Dilution rates vary from 4:1 water:emulsion to 12:1 water:emulsion, depending on surface condition and application rate.

A wetting agent or surfactant may be added to assist dilution and surface penetration. The wetting agent must be compatible with the type of emulsion used. Advice on compatible wetting agents and recommended dosage rates is obtainable from bitumen emulsion suppliers.

Compatibility of the water must be checked before diluting emulsion.

When diluting emulsions, it is essential to add water to the emulsion, not emulsion to water to avoid premature breaking of emulsion.

Only sufficient diluted emulsion for immediate use should be produced at one

### Key Summary

This issue of 'pavement work tips' describes the use of bitumen emulsion for dust laying on unsealed granular pavements

*continued on reverse*



*Section of road in background shows application of bitumen emulsion*



*Close-up of surface after an application of emulsion*

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time, as stored diluted emulsions are generally unstable.

## APPLICATION RATES

A typical application rate for diluted emulsion is about 1.0 L/m<sup>2</sup> of total liquid. If surface run-off occurs, the rate of application should be reduced.

Lower application rates and higher concentrations of emulsion are used on hard surfaces. Higher application rates and more diluted mixtures are used on softer and more permeable surfaces.

## OPERATIONS

It is preferable to shape, if necessary, and lightly sweep the surface to remove excessive dust and loose material. A preliminary dampening may assist in obtaining a uniform distribution. Excessive dust will reduce effectiveness and require more applications.

Spraying is generally carried out with a bitumen sprayer.

Diluted anionic emulsions may be applied with a standard water cart, preferably one with a pressure spray bar. Unbroken anionic emulsions can generally be completely removed by flushing with clean water to leave little, if any, bituminous residues.

Cationic emulsions should only be used in a conventional bitumen sprayer, as they leave a coating of bitumen on any surface, including metal, with which they come into contact. Bituminous residues can be difficult to remove from equipment that is not designed for spraying of bituminous materials.

Traffic should be kept off the surface until the emulsion is fully broken and the surface is dry. This is generally a minimum of 2 to 3 hours.

## LIFE EXPECTANCY

The initial emulsion dust laying treatment is usually followed up with a second application after 2 to 3 days. A further treatment may be applied after 3 to 4 weeks.

Effective service life can vary from several weeks to six months or more, depending on:

- the number of applications,
- weather,
- traffic conditions, and
- nature of pavement material.

Service life can be extended by repeated applications. The time interval between subsequent applications generally increases.

## DUST LAYING USING SOIL STABILISATION TECHNIQUES

Greater effectiveness of bitumen emulsion as a dust laying procedure for unsealed granular pavements may be achieved using stabilisation techniques.

Again, slow setting grades of emulsion (ASS or CSS) are used, but without dilution.

Emulsion is applied by spray bar to a scarified surface and then mixed in by a stabilising machine or grader, prior to compaction of the surface layer.

Typical application rates vary from 1% to 3% of residual binder by mass of the soil being treated. Lower application rates are used with well-graded granular materials. Higher rates are required for sandy materials. Stabilisation using bitumen emulsion is not suitable for fine-grained soils and materials of high plasticity.

Efficiency of distribution of the emulsion through the soil is influenced by moisture content. A moist soil facilitates mixing and even distribution. Dry soil causes premature breaking of the emulsion and poor distribution. Excessive moisture makes the soil unstable and prevents proper compaction.

## REFERENCES

- ARRB TR (1996) Road Dust Control Techniques, ARRB TR Special Report 54.
- Austrroads (1998) Guide to Stabilisation in Roadworks, AP-60/98.
- Austrroads (2002) Guide to the Selection and use of Bitumen Emulsions, AP-G73/02.

*For more information on any of the construction practices discussed in "pavement work tips", please contact either your local AUSTRROADS Pavement Reference Group representative or AAPA — tel (03) 9853 3595; fax (03) 9853 3484; e-mail: info@aapa.asn.au*

*A complete list of "pavement work tips" issues is available on AAPA's web site: www.aapa.asn.au*

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*This edition was prepared by John Rebbechi in consultation with members of the National Bituminous Surfacing Research Group.*

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