pavement work tips

AUSTROADS PAVEMENT REFERENCE GROUP

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Sprayed Sealing - Surface Enrichment

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INTRODUCTION

Surface enrichment is a light application of a bituminous material, without the use of a cover aggregate, to an existing sprayed seal surface in order to increase the binder content of the seal.

Alternative names for surface enrichment include fog coat, wash coat and overspray.

USE OF SURFACE ENRICHMENT

Surface enrichment is generally only applicable to areas of low traffic, e.g roads with less than about 100 v/l/d, road shoulders, etc. Traffic management requirements, surface condition and surface texture largely determine suitability for surface enrichment.

The service life of sprayed seals in areas of low traffic is generally determined by long-term, gradual hardening of the bitumen binder to the point where aggregate loss or cracking may lead to accelerated deterioration and the need for some form of maintenance intervention.

In such circumstances, surface enrichment can be an effective and economic treatment that can extend the life of a seal by, typically, three to five years.

Surface enrichment may also be used to arrest premature aggregate loss arising from inadequate application of binder.

Enrichment is only effective if the pavement is sound and the amount of stone loss or cracking is minimal. There must be adequate texture to accommodate the additional binder without compromising surface friction properties. As a general rule, there should be at least 1 mm texture depth remaining after treatment.

Surface enrichment may be repeated several times provided that sufficient texture remains after each treatment.

MATERIALS

Materials used for surface enrichment include:

- bitumen emulsion
- cutback bitumen
- foamed bitumen
- proprietary materials.

In most cases the choice of material will depend on cost, availability and suitability of spraying equipment.

Bitumen emulsion

Slow and medium setting emulsions (ASS, AMS, CSS and CMS) are generally used for enrichment work. Rapid setting emulsions should not be used as they tend to break on the aggregate surface, reducing the amount of bitumen run-off available for filling the voids, and increasing the risk of tyre pick-up. Slow and medium setting grades of emulsion may be diluted with water to improve coverage and flow between the aggregate particles. Dilution, if required, must use a compatible water and generally not exceed 1:1. When diluting emulsions, it is essential to add water

continued on reverse

Figure 1. Surface enrichment before (left) and after (right)

Key Summary

This issue of 'pavement work tips' provides a guide to extending the life of sprayed seals using surface enrichment.

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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 time, as stored diluted emulsions may be unstable.

Emulsions generally involve a residual binder that is free of volatile hydrocarbon materials (flux or cutter oils). Emulsions are susceptible to tyre pick-up until fully broken. Curing time is typically 1 to 2 hours, but this will vary with emulsion type, application rates and weather conditions. Traffic must be excluded during this time. In some circumstances, a light sand covering may be spread to allow earlier trafficking although covering should generally be avoided.

Cutback bitumen

Cutback bitumen is generally prepared with Class 170 bitumen and cutter oil. The proportion of cutter oil depends on surface condition and weather conditions at the time of application. More fluid binders may be required for rough textured aggregates and lighter application rates. Table 1 provides typical proportions of cutter oil for varying pavement temperatures.

Pavement temperature ^{o}C	Cutter oil – % of total mixture
15 – 20	25
20 – 25	20
25 – 30	15
> 30	12

Table 1. Typical cutting back for surface enrichment

When cutting back for surface enrichment work it is preferable to add too much cutter rather than too little. A lack of cutter may lead to poor coverage or poor runoff into aggregate voids.

Cutback bitumen allows flexibility of surface enrichment work, particularly in remote areas, as it uses standard materials (bitumen and cutter oil) that enable preparation of binder on site.

Foamed bitumen

Hot bitumen is "foamed" at the spraying nozzle using a controlled amount of water that causes a rapid increase in volume. The binder remains fluid until the foam collapses, leaving straight residual bitumen.

Foamed bitumen does not involve emulsification or use of cutter oils, but can only be applied with a purpose-built sprayer.

Proprietary products

Proprietary products include:

- rejuvenating agents
- combinations of rejuvenating agents and bitumen.

Rejuvenating agents are generally an emulsified oil. They may be used to restore hardened binder properties where there is adequate residual binder volume and no significant loss of aggregate.

Combination materials are used to provide both rejuvenation of hardened binder and addition to binder volume.

Proprietary materials should be used in strict accordance with the manufacturer's guidelines.

APPLICATION

Application rates

Application rate will vary according to surface texture and the volume of voids to be filled. Application rates for bituminous materials are commonly 0.5 to 0.8 L/m^2 of residual binder (excluding water in emulsions or cutter oil in cutback bitumen) but may be as little as 0.3 L/m^2 in some situations.

Procedures

Surface enrichment should only be carried out in fine weather and in single lane widths. The pavement should be swept to ensure that it is free from dust and loose material.

The pavement should generally be dry. Some surface dampness may be tolerated with emulsions, but could delay opening to traffic.

In some cases, surface enrichment may be applied in two passes, in opposite directions, to improve evenness of coating, or to avoid binder run-off at higher application rates.

For more information on any of the construction practices discussed in "pavement work tips", please contact either your local AUSTROADS 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

Issues may be downloaded using Adobe Acrobat Reader. Copies may also be obtained from AAPA.

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