

Treatment of Flushed Seals Using Chemical Solvents

pavement work tips – No 48

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INTRODUCTION

A sprayed seal is considered to be flushed, or bleeding, when the binder is over, or near, the top of the aggregate. This may be caused by:

- too much binder for the road conditions
- excess cutter oil softening binder in warm weather
- non-uniformity/patching of original surfacing
- embedment of the aggregate.

Flushing or bleeding can result in pavement surfaces with:

- poor and variable skid resistance
- pick-up of binder (and aggregate) by vehicle tyres, reducing the waterproofing properties of the seal, and sometimes leaving rough surfaces
- bitumen tracked past the area that has bled.

Stripping of aggregate can also lead to exposure of binder with a similar outcome to a flushed seal.

Various techniques for treatment of flushed surfaces, including application of additional aggregate, removal of excess binder or resurfacing are referred to in Pavement Work Tip No 7. This pavement work tip describes the specific technique for applying additional aggregate with the assistance of a chemical solvent to soften the binder prior to the application of aggregate.

In some cases flushed areas can be treated by application of a small sized aggregate directly to the flushed area. This is generally most effective on fresh, lively binders and in warm dry conditions. Effectiveness can be improved by using precoated aggregates.

The most effective solvents for softening of binder are generally supplied under proprietary names and comprise two major groups.

- Solvent only
- Solvent plus Gilsonite.

Solvent only

This involves the spraying of a solvent onto the pavement, which softens the binder and allows fresh aggregate to be spread and rolled into the bitumen. After curing of the solvent, the binder hardens again.

Solvents of higher aromaticity to normal cutter oils are preferred in order to speed up both the softening of the existing bitumen and the rate of curing. Suitable solvents are supplied under trade names such as Pegasol and Solvesso 150.

Solvent containing Gilsonite

This involves spraying a solvent containing a bitumen hardener (gilsonite). The solvent initially softens the binder to allow the binder to wet and bond to the new cover aggregate. The gilsonite remains in the surface after the solvent has evaporated leaving a harder and more viscous binder. The seal is thus less susceptible to bleeding again in subsequent hot weather. Aggregate is applied and rolled as referred to above.

Solvent plus gilsonite is usually supplied as a proprietary product under the trade name of Gilsabind.

SELECTING TREATMENT OPTIONS

- Generally, either solvent treatment will provide a similar outcome. Local experience, practices and availability will influence the choice.
- The 'solvent only' treatment is preferred when there is ample excess binder to hold the cover aggregate, and continued softness of binder is not an issue.
- The higher application rate of the 'solvent and gilsonite' treatment provides greater fluidity for improved aggregate adhesion and less risk of continued flushing.

Key Summary

This issue of "pavement work tips" provides guidelines for restoring texture to bleeding or flushed surfaces by applying additional aggregate with the assistance of chemical solvents.



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continued on reverse

- Treatments may need to be repeated where flushing is exceptionally bad and there is a large excess of binder.
- The final result should provide a reasonable surface texture, but cannot always be expected to perform like a normal seal coat.
- These treatments have given satisfactory service of up to 5 years, depending on location and traffic, before resealing was required.

Solvent application rates

Typical application rates are 0.2 L/m² for solvent only and up to 0.5 L/m² for the solvent/gilsonite combination.

Aggregate size

Size 5, 7 or 10 mm aggregate may be used. The size of aggregate is influenced by the amount of excess binder. Size 7 mm has been found to be suitable for a large range of conditions and traffic. If in doubt, a small trial should be carried out to select the most appropriate size.

Procedures

The following procedures are recommended in order to minimise risk of failure and to provide an acceptable standard of surfacing:

- Pavement temperatures should be at least 20°C, and the weather expected to be warm and dry for the next 12–24 hours.
- As application rates are relatively low, the required speeds for normal bitumen sprayers may be rather high. Smaller spraying nozzles should be used to reduce the spraying speed. For small areas, hand spraying may be used.
- The reaction time is dependent upon the temperature of the pavement and the prevailing weather conditions. When the solvent has reacted sufficiently with the binder, the binder appears very wet and is tacky 'underfoot'. Longer reaction times may be required for polymer modified binders compared to Class 170 bitumen.
- Aggregate should be precoated, and precoating should be nearly dry at the time of use.
- Aggregate cover is applied about 20% lighter than normal, and may require brooming to keep it on the treated area.
- Rolling should be carried out with pneumatic tyred multi-wheel rollers.
- The aggregate must be rolled until the binder has regained sufficient strength to hold the aggregate.
- Just prior to work starting, the area must be signed to warn of loose aggregate. All loose aggregate should be removed after 24 hours.

Care in cooler conditions

Solvent treatments may be used when the pavement temperature is below 20°C, but in this instance there is greater risk of failure and:

- longer times are required for both reaction of the solvent and development of adhesion between the binder and the aggregate
- extended traffic control may be required.

Rectifying non-uniform surface texture

Solvent treatments may be used to correct non-uniform surface texture; e.g. where there is bleeding/flushing in the wheel paths and a coarser texture outside the wheel path areas.

Stripped areas

Solvent treatments may also be suitable for treatment of exposed areas of binder in stripped or partially stripped seals.

Resealing over treated areas

Further resealing should only be planned or carried out after the solvent has been given sufficient time to settle and has proven successful.

Safe handling

Solvent products are highly flammable. The products are normally sprayed at ambient temperature and must NEVER be heated.

The sprayer tank and heating tubes must be cooled prior to filling with solvent.

Solvent materials must be stored and handled in accordance with the relevant Material Safety Data Sheet.

REFERENCES

Pavement Work Tip No 7, Treatment of bleeding or flushed surfaces.

Pavement Work Tip No 44, High pressure water retexturing.



Solvent sprayed onto flushed wheelpath



Covered with size 7 aggregate

For more information on any of the construction practices discussed in "pavement work tips", please contact either your local AUSTROADS 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 website: www.aapa.asn.au

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