

## TREATMENT OF FLUSHED SEALS USING CHEMICAL SOLVENTS

### 1. INTRODUCTION

A flushed or bleeding seal may be treated using chemical solvent. A sprayed seal surfacing may bleed or flush if too much bitumen binder or cutter is used during spraying, or if surface imperfections in the original surfacing reflect through the seal. Generally this occurs in hot weather during the first two years after the application of the seal and produces areas which have reduced or no macrotexture. In addition, embedment of the seal aggregate into the underlying pavement may also result in flushing.

Flushing or bleeding can produce pavement surfaces:

- which have poor skid resistance;
- where the binder (and aggregate) has been picked up by vehicle tyres thus reducing the waterproofing; and
- where the binder has been tracked onto the pavement past the area that has bled or flushed thus creating an unsightly surface.

There are currently several treatment options for flushed and bleeding seals including the use of chemical solvents, and the application of High Pressure Water Retexturing (HPWR). Pre-spraying techniques (refer Technical Note 23) can also be used to significantly reduce the likelihood of seal flushing.

In addition, specialised bitumen sprayers have been developed that are able to apply a varying binder application rate across a pavement. While these sprayers are currently not available locally, some manufacturers are considering their use. If introduced these types of sprayer will provide an additional option in the treatment of variable surface texture, including flushed and bleeding seals.

### 2. IMMEDIATE TREATMENT OF FLUSHED SEALS

On occasions when bleeding or flushing occurs rapidly, for example after an extended period of hot weather, it may be necessary to treat the surfacing immediately to prevent aggregate and seal pick up. Treatments that can be effective in the short term are:

- to grit the flushed area with clean (sometimes pre-coated) size 5 mm or preferably 7 mm aggregate to provide texture and an air void between the binder and the tyres of vehicles. In this case some of the grit may be held by the excess binder and provide a temporary surfacing; and
- to temporarily cool the pavement by the application of water.

Grit treatments should only be used if required for road safety reasons as they can make the subsequent treatment with solvents or by other means more difficult.

### 3. SOLVENT TREATMENTS

**General:** Significant success has been achieved in the treatment of flushed and bleeding seals by using proprietary agents (eg. Pegasol, Solvesso 150, Gilsabind and other similar products) which allow the application of additional aggregate after the initial softening and “wetting” of the bitumen.

**The Process:** The process involves spraying a highly aromatic solvent (a type of cutting oil) onto the pavement which softens the binder and allows fresh aggregate (up to size 10 mm) to be spread and rolled into the bitumen. After evaporation of the solvent, the binder rapidly hardens again.

The softening agent is sprayed onto the flushed surface and allowed to react with the binder. Typical application rates are 0.2 l/m<sup>2</sup> (for Pegasol, Solvesso 150 and similar products) and 0.5 l/m<sup>2</sup> (for Gilsabind). The reaction time is dependent upon the temperature of the pavement and the prevailing weather conditions. When the solvent has reacted with the binder sufficiently the binder appears very wet and is very tacky “underfoot”. A good quality, clean aggregate (size 5, 7 or 10 mm as appropriate) should be lightly spread and rolled into the surface.

It is important that:

- the solvent treatment is undertaken when the pavement temperature is greater than 25°C and rising;
- the size of the aggregate used is appropriate for the amount of excess binder in the flushed areas. It may be appropriate to carry out a trial over a small area to select the most appropriate aggregate size;
- the aggregate be pre-coated, preferably with a binder based precoat although diesel based precoat has been found to be satisfactory. On occasions it has also been found satisfactory to use very clean aggregate without pre-coating and this has resulted in the treatment setting up quicker than a diesel precoat treatment;
- the aggregate be spread very lightly (eg. 180 to 200 m<sup>2</sup>/m<sup>3</sup>) so that the aggregate can fully use the excess binder and fit into the spaces between the aggregate of the original seal; and

- the area must be rolled for a minimum of one hour to ensure that the binder in the original seal has obtained adequate strength to hold the aggregate. This may require extended periods of traffic control.

**Rolling:** Rolling is often undertaken with a multi wheel roller although light steel wheel rollers have been used on uniformly shaped pavements. When using a steel wheel roller, care should be taken not to crush the aggregate which can produce fines which may prevent adhesion.

It may also be necessary to repeat the treatment at locations where flushing is exceptionally bad.

**Low temperature treatment:** Flushed seals can be treated on some occasions when the air and pavement temperatures are less than 25°C although at low temperatures:

- it takes a longer period of time for the solvent to react with the binder; and
- it is necessary to control traffic for extended periods as it takes a long time for the solvent to evaporate and allow the original binder to harden.

For these reasons, treatments in cool weather (less than 25°C) are not recommended as there is a greater risk of failure.

**Gilsabind Treatment:** In the case of a Gilsabind treatment, the gilsonite in the product reacts with the original binder to chemically harden the bitumen. In some circumstances the ability to harden the original binder is a desirable property.

VicRoads has had success using Gilsabind on older sprayed seals where the older binder is less reactive to Pegasol or other similar products.

#### 4. CREATING A UNIFORM SURFACE TEXTURE

The above treatments can be used to create a uniform surface texture over extensive lengths of sprayed seal pavement, for example, where there is variable flushing and bleeding in the wheel paths and flushed or coarse texture between the wheel paths.

In these cases the entire lane width can be sprayed with a solvent and aggregate spread across the lane and rolled in. Where there is sufficient excess binder the new aggregate will adhere resulting in a surface that is significantly more uniform than the original surface.

#### 5. TREATMENT OF STRIPPED AREAS

Occasionally sprayed seals strip in isolated areas or the aggregate does not take to the binder. This is often due to “cold areas” such as those shaded by trees, bridge decks or due to inadequate cutting back of the bitumen.

If these areas are treated before significant aggregate or binder is lost, a solvent treatment can be used to repair or salvage the seal.

In the case of isolated areas of stripping, the application of a solvent as described above, softens the binder and provided the pavement temperature is above 25°C should allow it to bind to the new precoated aggregate.

Normally the aggregate used is one size smaller than the aggregate in the original seal.

For these treatments traffic control must be provided until the binder has cured sufficiently to hold the aggregate.

#### 6. RESEALING OVER TREATED AREAS

When a surface has been treated with a solvent, a substantial amount of the solvent evaporates on the day that the treatment is undertaken.

Although a flushed surface treated with a solvent can be resealed soon after completion, it is preferable to plan works so that there is an adequate “settling down” time. This time can vary from two weeks after treatment when most of the solvent has evaporated to the following season when there has been some binder hardening and the aggregate matrix is stable.

Solvent treatments have been known to last many years before re-sealing is necessary.

#### 7. OCCUPATIONAL HEALTH AND SAFETY

The products described above should never be heated because they are flammable. Reference should be made to the relevant Material Safety Data Sheet for each product for information on health hazards, precautions for use, safe handling procedures etc.

#### 8. ALTERNATIVE TREATMENTS FOR FLUSHED SEALS

Alternative treatments for treating flushed seals include the use of preheated aggregates either in conjunction with chemical solvents or as a treatment on their own. Also the HPWR process is often used to treat flushed seals. Further information on this process can be found in Technical Note 62.

#### 9. REFERENCES

Product information and Material Safety Data Sheets.

#### 10. CONTACT OFFICERS

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