

Sprayed Sealing - Selection of Initial Treatments

pavement work tips – No 18

August 2010

TYPES OF INITIAL TREATMENT

General

Initial treatments for prepared crushed rock or gravel pavements are generally one of two types:

- Prime and seal; or
- Primerseal.

Each type has strengths and weaknesses that need to be considered carefully at both specification and implementation stages. General guidance to the selection of the more suitable of the two alternatives is summarised in Tables 1 and 2.

Further tips on preparing pavements for initial treatments and construction procedures are provided in Pavement Work Tip Nos 1, 43 and 49.

Prime and Seal

A prime and seal is a two-stage process. The first stage is a primer without cover aggregate. It is used to bind the surface of an unbound granular layer, provide a bond onto which a bituminous surfacing can adhere, and to provide a surface that minimises absorption of the binder from the seal coat into the pavement.

The second stage is a binder sprayed onto the primed surface, covered with a layer of aggregate, rolled and opened to controlled traffic. This provides a wearing surface for traffic and waterproofs the pavement.

Where practicable, a prime and seal will generally provide a superior treatment to that of a primerseal.

Primerseal

A primerseal is a single stage treatment. A primerbinder is sprayed onto a prepared granular pavement surface (i.e. not primed), covered with a layer of size 5 mm, 7 mm or 10 mm aggregate, rolled and opened to controlled traffic.

The primerbinder must be fluid enough to penetrate and adhere to the pavement surface as well as hold the aggregate.

Cutback bitumen is the most common primerbinder with different grades applicable to summer and winter.

As an alternative to cutback bitumen, bitumen emulsion binders may be suitable depending on the type and condition of the pavement, and weather.

Primerbinders are generally more fluid than seal coat binders. As a consequence, they are restricted to use with small size aggregates (10 mm or less) and have a shorter life than a seal coat, thus needing a further seal coat or asphalt applied within one to three years.

Cutback bitumen primerseals should be cured for a minimum of 6 months, or possibly up to 12 months in cool conditions, to reduce the risk of cutters softening the following bituminous surfacing.

Primerseals constructed with bitumen emulsion binder may be covered with asphalt as early as 2 to 3 days, although a minimum curing period of three months is recommended before sprayed sealing.

MINIMISING RISKS ASSOCIATED VARIABLE WEATHER

Priming

Risks associated with priming in damp or unstable weather conditions include:

- Poor penetration of primer into damp surfaces and slow curing during cold, damp conditions.
- Possible run-off of primer washed off by heavy rain before primer has dried. This may result in loss of primer, staining of adjoining surfaces and, in extreme cases, damage to watercourses, etc.

Programming of prime and seal works in cold or wet seasonal conditions should be avoided. If conditions are unsuitable for priming, the alternative of primerseal may be considered as the surfacing of choice, or as a contingency.

Key Summary

This issue of "pavement work tips" provides a guide to the selection and use of either a prime and seal or primerseal as initial treatment for granular pavements



continued on reverse

Primersealing

Risks associated with primersealing in damp or unstable weather conditions include:

- Embedment of aggregate into damp base course, resulting in surface bleeding.
- Loss of aggregate due to rain. Greatest risk occurs if heavy rain falls within about 48 hours of completion.
- Emulsification of binder due to combined action of heavy traffic and rain.

Risks associated with high temperatures include the potential for bleeding of primerseal binders. In extreme conditions this can result in potholing due to binder pick-up on vehicle tyres.

Actions that can be taken to minimise these risks, or to minimise damage as a result of rain or extreme temperatures, include:

- In cold seasonal conditions, provide for the use of dry, pre-coated (bitumen-based)

aggregate that is delivered dry on the day, or delivered previously and kept dry by placing in a covered stacksite.

- Provide for inspection and monitoring of all primerseal works during early trafficking.
- Prepare contingency plans for gritting and traffic control of works in the event of rain or bleeding of binder in hot weather.

Controlled, low speed traffic and timely gritting are important elements in reducing damage to primerseals during periods of rain in first few days of trafficking.

REFERENCES

Pavement Work Tip No 1, Priming of pavements.

Pavement Work Tip No 43, Primersealing of pavements.

Pavement Work Tip No 49, Preparation of pavements for priming and primersealing.

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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This edition was prepared by members of the Bituminous Surfacing Research Reference Group.

Table 1: Advantages and disadvantages of primerseals and prime and seals

Initial Treatment type	Advantages	Disadvantages
Prime and seal	Generally more economical in overall cost. Reduces the absorption of seal coat binder into the pavement. Thicker waterproof layer. Strong bond to the pavement. Prime may be used to protect pavement prior to sealing. Easier to cope with non-uniform pavement condition or texture.	The pavement surface must be dry. Best results are obtained in dry/warm conditions. Two-stage process. The primer must dry and set up before sealing. Use of primed pavement by traffic is restricted. Rain may cause uncured primer to be washed off the pavement with loss of primer and risk of environmental damage.
Primerseal	Can be placed on a damp surface. One step process that can be opened to controlled traffic immediately it is completed. Allows repair of pavement deficiencies prior to final seal or asphaltting.	Relatively short term treatment of one to three years. Cutback bitumen primerseals require up to 12 months curing. Rain soon after construction can lead to problems such as aggregate embedment or binder emulsification and pick-up by vehicles. Must be followed by a "final" seal to complete the treatment within 1 to 3 years.

Table 2: Pavement surface condition and weather conditions for use of initial treatments

Surface condition	Traffic	Weather	Comments	
			Prime and seal	Primerseal
Dry	Low ¹	Stable	Initially more costly than a primerseal but more economical overall as it does not need a "final" seal.	Suitable but the pavement surface will need to be dampened.
Dry or damp	Under traffic and >150 v/l/d	Stable	Not suitable.	Suitable but the pavement must be sound. Refer also to advice on minimising risks.
Dry	Low ¹	Unstable	Not suitable unless at least three to four days of dry weather available for the primer to cure.	Suitable but rain occurring early after treatment may cause problems. Refer to advice on minimising risks.
Damp	Low ¹	Unstable	May be suitable provided that a light primer is used and additional time allowed for drying and curing.	Suitable provided that time allowed for drying and curing
Damp	>150 v/l/d	Unstable	Not suitable.	May be suitable, but refer to advice on minimising risks.

1. Includes sites where traffic can be detoured or new construction where there is little or no traffic during construction phase.