

**SECTION 18 – BITUMINOUS SLURRY SEALING**

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## SECTION 18 – BITUMINOUS SLURRY SEALING

### 18.1 GENERAL

This section covers the requirements for manufacture and placing sizes 3, 5, 7 and 10 mm bituminous slurry surfacing. The requirements relate to materials, mix design and placing bituminous slurry surfacing generally in accordance with standards set by the International Slurry Surfacing Association (ISSA) for micro-surfacing. This specification accords with the VicRoads Specification Section 427 except as shown in *italics*.

### 18.2 DEFINITIONS

#### **Assigned Los Angeles Abrasion Loss**

The assigned Los Angeles Abrasion Loss is a hardness rating derived from Los Angeles Abrasion Loss test results and is assigned to each source by VicRoads on the basis of past test data obtained from testing products.

#### **Assigned Polished Stone Value**

The assigned Polished Stone Value is a friction rating derived from Polished Stone Value test results and is assigned to each source by VicRoads on the basis of past test data obtained from testing products.

#### **Bitumen Emulsion**

A system of fine droplets of bitumen with or without polymer, suspended in a mixture of water and emulsifier which begins to set up on contact with surfaces and when exposed to air.

#### **Bituminous Slurry**

A mixture of fine graded aggregate, bitumen emulsion and water of sufficient fluidity to be capable of being screeded over a road surface in a very thin layer without the need for heating or use of mechanical compaction equipment.

#### **Micro-Surfacing**

A slurry surfacing that normally contains polymer modified binder for better stability and cohesion particularly on heavily trafficked roads and for coarse aggregate mixes.

#### **Mean Average Texture Depth**

The mean average texture depth is the mean of 10 tests for average texture depth using the Sand Patch Test Method.

### 18.3 AGGREGATES

#### (a) General

The combined aggregate mixture shall consist of crushed rock or a mixture of crushed rock and sand.

Aggregates shall consist of clean, hard, durable, angular rock fragments of uniform quality.

Sand aggregates shall consist of clean, hard, durable grains free from lumps, clay, mica and foreign matter.

#### (b) Source Rock

Source rock shall comply with the requirements of Section 801 - Source Rock for the Production of Crushed Rock and Aggregates.

#### (c) Crushed Aggregate Products

The minimum sand equivalent of the crushed product shall be 60.

## 18.4 AGGREGATE GRADING

The grading of the aggregates shall conform to the following grading limits for dense graded Size 3, Size 5, Size 7 and Size 10 nominal size mixes as shown in Table 18.4.1 and as specified in Clause 18.24.

**Table 18.4.1**

Sieve Size (mm)	Size 3 (% Passing)	Size 5 (% Passing)	Size 7 (% Passing)	Size 10 (% Passing)
13.2	100	100	100	100
9.5	100	100	100	95-100
6.7	100	100	80-100	75-95
4.75	100	90-100	70-90	60-85
2.36	90-100	60-85	45-70	40-60
1.18	65-90	40-65	28-50	28-45
0.600	40-65	25-45	19-34	19-34
0.300	25-42	15-30	12-25	12-25
0.150	15-25	10-20	7-18	7-18
0.075	10-15	5-15	5-12	4-8

**Dense graded aggregate which does not comply with Table 18.4.1 but has a proven satisfactory performance may be accepted for use subject to review by the Superintendent.**

## 18.5 ADDED FILLER

Added mineral filler used in the mix shall comply with Australian Standard AS 2357 - Mineral Fillers for Asphalt and the quantity added to the mix during placing shall not vary by more than 1% from the filler content for the mix design.

## 18.6 BITUMINOUS MATERIAL

Bitumen used for emulsion manufacture shall comply with the requirements of AS 2008 - Residual Bitumen for Pavements.

Polymer shall be added to the formulation of the emulsion to enhance its behaviour and field performance and meet the mix design requirements specified in Table 18.8.1 and the minimum softening point of the bituminous residue shall be 57°C as determined by Australian Standard Test Method AS 2341.18 (1992).

## 18.7 WATER

Water to be added to the mix shall be tested for compatibility with the design mix prior to use.

## 18.8 MIX DESIGN AND TEST REQUIREMENTS

The Contractor shall provide all mix designs.

**The mix designs and the information listed below shall be submitted to the Superintendent at least two weeks prior to the proposed date for the commencement of supply of the slurry surfacing. No slurry surfacing shall be supplied until the mix has been approved by the Superintendent.**

For all approved mixes the Contractor shall remain fully responsible for the performance of the mix.

**The Superintendent shall also be notified before any changes are made to the components or proportions of components used in the approved mix.**

Where a current approved mix is available for the size of mix specified the Contractor shall forward the approved mix design number with the tender.

New mix designs shall be carried out where it is proposed to change the source grading or nature of the aggregates, or where current approved mix designs are more than two years old.

For every approved mix design, the Superintendent will allocate and advise the Contractor of a mix design number which shall be used to identify the particular mix.

The following information is required for each new mix design:

- (a) Source of the aggregates.
- (b) Grading aim for aggregates.
- (c) Assigned polished stone value (PSV) of the source rock.
- (d) Degradation Factor and Sand Equivalent of the crusher fines component.
- (e) Bitumen Content of Emulsion.
- (f) Softening Point of Emulsion Residue.
- (g) Three 2 kg samples of aggregate representing a minimum of 600 cubic metres of crushed material on which the mix design has been based.
- (h) One litre bitumen emulsion on which the mix has been based including information on the type and source of manufacture.
- (i) Slurry properties determined from tests on laboratory mixes as specified in Table 18.8.1.

The following tests shall be carried out on the laboratory mixes specified in Table 18.8.1.

**Table 18.8.1**

Property	Test	Description	Requirement
Traffic Time	ISSA TB 139	Wet Cohesion between 21°C and 29°C @ 30 minutes (Initial set) @ 60 minutes (Trafficking)	12 kg-cm (min) 20 kg-cm (min)
Max. Binder Content under Heavy Traffic (>3000 vpd)	ISSA TB 109	Max. Binder Content by L.W.T. Sand Adhesion	540 g/m <sup>2</sup> (max)
Adhesion	ISSA TB-114 ISSA TB-144	Wet Stripping Shultz-Breuer and Ruck	Pass (90% min) 11 Points
Wearing	ISSA TB-100	Wet Track Abrasion Loss One hour soak Six day soak	540 g/m <sup>2</sup> (max) 800 g/m <sup>2</sup> (max)

If it is proposed to use a mix which does not meet all the above requirements consideration may be given to its acceptance based on past field performance under similar conditions.

## 18.9 ADDITIVES

Additives may be used to control the setting speed of the mix depending on ambient conditions and traffic requirements. The Contractor shall specify the use of any additives when submitting the mix design.

## 18.10 AMBIENT CONDITIONS FOR PLACING

Unless otherwise specified fresh slurry surfacing shall be capable of being trafficked within one hour of being placed. Slurry surfacing shall not be placed when the pavement temperature and air temperature is 10°C and falling but may be placed when the pavement and air temperature is 5°C and rising.

Slurry surfacing shall not be placed when the ambient temperature is above 40°C without prior consultation with the Superintendent nor shall it be placed during rain or when rain is imminent. If weather conditions rapidly change to prevent the slurry surfacing being trafficked within one hour, work shall not proceed without prior consultation with the Superintendent.

### 18.11 SURFACE PREPARATION

Prior to slurry surfacing commencing, the Contractor shall remove all deleterious material and sweep the surface clean. The surface may be dampened by lightly spraying with water prior to placing slurry.

### 18.12 PROTECTION OF APPURTENANCES

Manhole covers, entry pits and valve covers and other appurtenances shall be protected by papering or other suitable means to prevent these being covered or blocked by slurry surfacing. All used paper or cover material including surplus slurry shall be removed from site.

### 18.13 MIXING AND SPREADING

**HP Spreading shall not commence until approval to proceed is obtained from the Superintendent.**

The metering devices used for slurry surfacing shall be re-calibrated every 12 months and shall be capable of consistently producing a uniform mix within the production tolerances for grading as shown in Table 18.13.1 and bitumen content as determined as part of the laboratory mix design.

**Table 18.13.1**

Sieve Size	Tolerance on Percentage Passing (by mass)			
	Size 3	Size 5	Size 7	Size 10
13.2	Nil	Nil	Nil	Nil
9.5	Nil	Nil	Nil	±6
6.7	Nil	Nil	± 6	± 6
4.75	Nil	± 6	± 6	± 6
2.36	± 5	± 5	± 5	± 5
1.18	± 5	± 5	± 5	± 5
0.600	± 4	± 4	± 4	± 4
0.300	± 3	± 3	± 3	± 3
0.150	± 2	± 2	± 2	± 2
0.075	± 1.5	± 1.5	± 1.5	± 1.5

If any device critical to correct proportioning of materials is overhauled or replaced the machine shall be re-calibrated prior to recommencement of work.

Adjustments to metering settings shall be made on a job by job or on a daily basis to allow for varying aggregate density, moisture content, and bitumen content of the emulsion.

**The Contractor shall produce a series of calibration charts or evidence of calibration prior to commencing work.**

The edge of the new slurry surface shall be located within 50 mm of all concrete edgings and sealed shoulders, and to within 100 mm of the specified width (or average width of carriageway if not specified) for roads with unsealed shoulders.

The tolerance on the residual binder content after curing shall be not more than 0.5% below or 1.0% above the mix design aim.

## 18.14 FREQUENCY OF PRODUCT TESTING

The Contractor shall test the constituents of the mix at a frequency which is sufficient to ensure that the material supplied under the contract complies with specified requirements which is not to be less than shown in Table 18.14.1.

**Table 18.14.1**

Checks Required	Minimum Frequency
Degradation Factor - Crusher Fines	One per month.
Sand Equivalent Test	One per 250 cubic metres of aggregates used or part thereof.
Unsound Rock Content	One per 200 cubic metres or part thereof sampled directly from stockpile on site or one per 200 cubic metres of production at the quarry source.
Sieve Analysis of Aggregates	One per 200 cubic metres or part thereof sampled directly from stockpile on site or one per 200 cubic metres of production at the quarry source.
Emulsion Content	One tank dipping or flow meter reading per batch or every 10 cubic metres of material placed, whichever is the lesser.
Binder Content and Full Sieve Analysis	One per 50 cubic metres or one per day from a sample of mix taken from the mixer, whichever is the lesser.
Residual Binder Content of Emulsion and Softening Point of Bituminous Residue	Certification of specification compliance for each delivery to site.

## 18.15 RUT FILLING COURSE

Where specified in Clause 18.24 or where wheel ruts average 25 mm or more in depth, a rut filling course shall be applied with the aid of a rut filling attachment to the mixer/spreader prior to placing the wearing course. Sections where rut filling has been carried out shall be trafficked for a minimum of 8 hours prior to placing the wearing course.

## 18.16 TACK COATING

Unless otherwise specified, concrete surfaces shall be primed with very light primer at a rate between 0.2 to 0.4 e/m<sup>2</sup> and allowed to cure for 5 days prior to placing slurry surfacing.

## 18.17 REGULATING COURSE

Where specified in Clause 18.24 or where the existing surface varies by more than 10 mm from a 3m straight edge, a regulating or "scratch" course shall be applied to the surface prior to placing the wearing course. The wearing course shall not be applied until the regulating course has set sufficiently to carry the mixer/spreader without damage.

For regulating or "scratch" courses, the spreader box shall be fitted with skids of not less than 1.6 m in length and where the shape of the existing surface permits, a rigid "strike off" blade may be specified.

## 18.18 WEARING COURSE

The wearing course shall be placed over the road surface at the average thickness specified in Clause 18.24. The average layer thickness shall not be less than the nominal aggregate size or greater than twice the nominal aggregate size. The layer thickness at any point shall not exceed three times the nominal aggregate size without first applying a regulating course or pre-filling isolated low areas.

## 18.19 JOINTS AND JUNCTIONS

The longitudinal joints of the wearing course shall be placed at either the edge of a traffic lane or in the centre of a traffic lane. The edge of the mat and joints shall be lightly screeded with a squeegee to achieve a smooth uniform edge and to remove isolated mis-matches in level or excess build up of surplus material at the edge of the run.

All joints shall be overlapped. The maximum overlap shall be 150 mm.

## 18.20 SURFACE FINISH AND SHAPE

The finished surface of the final wearing course shall not vary by more than 10 mm from a 3 m straight edge.

When requested by the Superintendent, the Contractor shall measure the Mean Average Texture Depth on a lot by lot basis by the Sand Patch Method. (Test Method RC 317.01)

For wearing course mixes of nominal size 7 or greater, the mean average surface texture depth determined from a lot of ten sand patch tests consisting of five tests taken at an equal spacing along each wheelpath shall be assessed as shown in Table 18.23.1. For the purpose of this test, a lot shall be considered as a maximum of 500 m of single traffic lane which has been trafficked for a minimum period of one month after completion.

Smaller areas not less than 100 m of single traffic lane which have a different uniform appearance such as a defective batch of material, may be treated as a separate lot.

## 18.21 CLEAN-UP

All surplus slurry shall be removed from site and any appurtenances such as kerb and channels shall be cleaned of all aggregate and bitumen deposited by the Contractor.

The aggregate stockpile site and mixing area occupied by the Contractor shall be restored to a similar condition as existed before occupation.

## 18.22 URGENT REPAIRS

If serious damage to the new slurry surface occurs due to either a poor mix or inclement weather, whereby it presents a hazard to road users, the road shall be made safe within 2 hours of notification. The Contractor shall submit proposals for the rectification of damaged work to the Superintendent for review prior to commencing further work. Rectification of the damaged work shall be carried out as soon as weather conditions permit.

## 18.23 ACCEPTANCE OF WORK

Unless otherwise specified or directed work shall be assessed in accordance with Table 18.23.1.

**Table 18.23.1**

* Variation in Binder Content (% of total mass) from the Design Mix	Mean Average Texture Depth (mm) or Size 7 & Size 10 Wearing Courses	Assessment
Not more than 0.5% below or 1.0% above	Greater than 0.7	Accept

For the purpose of applying the provisions contained in Table 18.23.1, the binder content is to be calculated from measured flow rates of aggregates and emulsion, the moisture content of the aggregates, before and after dippings from the emulsion tank, and the residual binder content of the emulsion as applicable. These provisions shall apply for every individual batch of material or for every 10 cubic metres placed, whichever is the lesser.

The requirements of Table 18.23.1 shall not apply to samples taken from the road for full sieve analysis and binder content unless results differ in a consistent way from the quantities measured by the mixer/spreader machine. In such cases the mixer-spreader shall be re-calibrated before further work proceeds.

- ☛ NOTE: The assessment of work in Table 18.23.1 shall apply for either the Binder Content or the Mean Average Texture Depth, as applicable. Variation in binder content limits shall apply to all mixes in all layers, and the Mean Average Texture Depth is an additional requirement for Size 7 and Size 10 wearing courses.

## 18.24 SCHEDULE OF DETAILS

Refer to Section 1.4 for Bituminous Slurry Surfacing Requirements (Clauses 18.3, 18.4, 18.15, 18.17 and 18.18)