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L.1 GENERAL

The following is the Specification for a Bituminous Primer, Primer Seal or Sealing Coat.

The Council shall regard the current VicRoads specification section 408 as the authority on all matters relative to materials quality and sprayed bituminous surfacing practice.

L.2 AGGREGATE

Aggregate shall consist of crushed stone, having clean, hard, stony, durable, uncoated particles free from all soft, friable, elongated or laminated pieces, organic matter or other deleterious substances. It shall conform to the physical characteristics, and shall be graded in accordance with the requirements for the particular purpose for which it is to be used as specified below.

The maximum percentage of wear by the Los Angeles Abrasion Test shall be 20 for basaltic and 35 for granite aggregate. The gradings of the aggregate for various purposes shall be in conformity with the relevant clauses contained in Section 831 of the VicRoads specification.

Granitic aggregates are generally used on low trafficked roads and basalt aggregates on major roads.

The Contractor shall confirm with the Superintendent the type of aggregate to be used.

All aggregate shall be loaded into trucks by means of an approved VicRoads type aggregate loader capable of screening, loading the pre-coating stockpiled aggregate. Front-end-loaders shall not be used for loading of aggregates.

L.3 PRIMER

All prepared surfaces for sealing shall be primed or primer sealed prior to sealing.

Primer for the priming coat of road sealing shall consist of approved "Priming" Tar or alternatively an approved bituminous compound priming mixture in conformity with Section 408 of the VicRoads specification.

The primer shall be of low viscosity, medium viscosity or high viscosity (that is "Light", "Medium" or "Heavy"), according to the nature of the crushed rock used in the pavement and the condition of the road after preparation for sealing.

The Superintendent shall decide whether a light, medium or heavy primer will be used.

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L.4 BITUMINOUS BINDER

Bitumen for the surface seal coats of the roadway shall be Class 170 and comply with the requirements of AS.2008. The bitumen or native asphalt shall be fluxed with asphaltic oil, and cut back with power kerosene to meet the prevailing conditions of air temperature, sun, cloud, shade, wind, cleanliness of aggregate and condition of pavement.

In general the proportions of bitumen, asphaltic oil and power kerosene shall be in accordance with the table L.4.1, but the exact proportions to be used shall be determined by the Superintendent from time to time during the progress of the work.

Table L.4.1

Size 7 aggregate - One sized								
Air Temp. in ^{o}C	**Parts of Flux Oil & Cutter per 100 parts of Bitumen by volume at 15^{o}C**							
	Traffic - Vehicles per day (12 hr. count)							
	Under 150		150-500		500-1000		Over 1000	
	Flux Oil	Cut.	Flux Oil	Cut.	Flux Oil	Cut.	Flux Oil	Cut.
15-20	4	12	2	12	-	12	-	10
20-25	4	8	2	8	-	8	-	6
25-30	4	6	2	6	-	6	-	4
30-35	4	4	2	4	--	4	-	2
35+	4	2	2	2	-	2	-	-

L.4 BITUMINOUS BINDER (cont'd)

Size 10 or 14 aggregate - One sized								
Air Temp. in ^{o}C	**Parts of Flux Oil & Cutter per 100 parts of Bitumen by volume at 15^{o}C**							
	Traffic - Vehicles per day (12 hr. count)							
	Under 150		150-500		500-1000		Over 1000	
	Flux Oil	Cut.	Flux Oil	Cut.	Flux Oil	Cut.	Flux Oil	Cut.
15-20	4	10	2	10	-	10	-	8
20-25	4	6	2	6	-	6	-	4
25-30	4	2	2	2	-	4	-	2
30-35	4	2	2	2	-	2	-	-
35+	4	-	2	-	-	-	-	-

L.5 CONDITIONS FOR SPRAYING

Pavement

The surface on which primer or binder is to be applied shall be dry. The surface on which primerbinder is to be applied shall be damp.

Ambient Temperature

Unless otherwise approved by the Superintendent, spraying shall not be carried out when the air temperature is less than that specified below.

Type of Work	**Air Temperature ^{o}C**
Priming	10
Primersealing	15
Sealing	15

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L.6 INITIAL TREATMENT OF PAVEMENT

After the top course of crushed rock has been consolidated to approval and subjected to normal traffic for a sufficient period to prevent its movement under traffic, it shall be sealed with one coat of primer and sealed as specified.

HP Sealing shall not be done unless the road is in perfect shape and smooth, hard and dry and has been approved by the Superintendent.

L.7 COMMENCEMENT OF SEALING

HP No sealing works shall be commenced without the approval of the Superintendent who shall specify the particular sections for which approval is given, and agree that there is sufficient material, suitable plant and personnel on site to carry out the works as specified.

L.8 PREPARATION OF PAVEMENTS FOR PRIMING

All dust, debris and foreign matter shall be removed from the pavement immediately before applying the primer coat. The surface shall be swept with a mechanically operated rotary broom, free and clean from all loose stones, dust and dirt, sufficient of the surface binding being removed to expose, but not dislodge the embedded stones of the pavement. Particular care shall be taken to thoroughly clean the outer edges of the surface to be treated.

Where required, hand brooming shall be used at intersections, bellmouths, and other areas.

Waste materials removed from the surface of the pavement shall be carted off and completely removed from the site. Under no circumstances shall such materials be applied to the treated surface.

L.9 PAPERING AND OTHER PROTECTION

The Contractor shall protect all kerbs and channels, manholes, fire plug covers etc., by covering them with medium grade paper weighted down with aggregate.

The Contractor shall lay paper at the start and finish of each sprayer run to ensure a clean cut-on and cut-off. The paper shall be Kraft 215 g/m^2 or an equivalent.

Edgings, raised pavement markers, adjoining structures and drainage pit covers and sections of roadway not required to be treated shall be protected from splash and all necessary precautions shall be taken to protect traffic and parked vehicles from airborne bituminous material.

L.9 PAPERING AND OTHER PROTECTION (cont'd)

Protective paper (and the material to hold it in place) shall be removed as soon as the work is completed.

Any side entry pits and other pits shall be protected from being contaminated with swept off material and/or aggregate.

If contamination occurs such pits shall be cleaned out as part of the brooming operation.

L.10 METHOD OF APPLYING PRIMER AND BINDER

All primer and bituminous binder shall be applied by means of an approved machine sprayer which shall be fitted with a tank of not less than 2000 litres capacity, and which shall be capable of spraying at a uniform rate of from 0.5 to 2.7 litres per square metre at any width of spray bar used.

The machine sprayer shall be fitted with pneumatic tyres, shall be equipped with a finely calibrated tachometer capable of registering speeds in metres per minute and shall be capable of moving at a steady speed when fully loaded.

The sprayer shall be equipped with a circulating system capable of thoroughly mixing all of the material in the sprayer tank at a rate of not less than 1000 litres per minute.

The pumping and control gear shall be capable of maintaining a constant spraying pressure of not less than 110 kilopascals. The manifold spray-bar shall be at least 40 mm diameter and of such a nature as to give a uniform pressure throughout its length. The size and arrangement of jets shall be such as to apply the material in a coating of uniform thickness throughout and to give the specified quantity per square metre.

Contractors will be required to provide evidence that the sprayer unit has been calibrated by VicRoads or other approved testing Authority during the current calendar year.

Operators of spray units shall be equipped with calibration charts and must be competent in the use of charts and the rates of application of residual binder, etc., being used.

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L.11 HEATING OF BINDER

All primer and binder shall be heated in approved heaters or kettles and shall be sprayed as soon as possible after heating to spraying temperatures as determined by Tables L.11.1 and L.11.2.

Table L.11.1 - Spraying Temperatures of Bituminous Materials

Material	Temperature °C	
	Minimum	Maximum
Very light primer	-	30
Light primer	-	35
Medium primer	35	55
Heavy primer	60	80
Light/Medium cutback bitumen primerbinder	120	135
Heavy cutback bitumen primerbinder	140	155
Bitumen emulsion:	40	
60% bitumen content	70	60
70% bitumen content		90
Class 170 bitumen	178	185
Fluxed and/or cutback bitumen binder	See Table L.11.2	See Table L.11.2

For fluxed and/or cutback bitumen binder, the spraying temperature shall be determined from Table L.11.2.

L.11 HEATING OF BINDER (cont'd)

Table L.11.2 - Spraying Temperatures for Fluxed and/or Cutback Bitumen Binder

Cutter, Parts by Volume per 100 parts of Class 170 Bitumen at 15°C	Flux Oil, Parts by Volume per 100 parts of Class 170 Bitumen at 15°C					
	0		2		4	
	Min °C	Max °C	Min °C	Max °C	Min °C	Max °C
0	178	185	170	184	166	180
2	170	184	166	180	162	178
4	166	180	162	178	160	174
6	162	178	160	174	158	172
8	160	174	158	172	154	170
10	158	172	154	170	152	168
12	154	170	152	168	150	164
14	152	168	150	164	148	162
16	150	164	148	162	144	160
18	148	162	144	160	142	158
20	144	160	142	158	140	156
22	142	158	140	156	138	154
24	140	156	138	154	136	152
26	138	154	136	152	134	150
28	136	152	134	150	132	148
30	134	150	132	148	130	146

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L.12 PRIMER COAT

The primer shall be applied at a temperature in accordance with Table L.11.1 at the rate of 0.5 to 1.1 litres per square metre of pavement surface, this quantity being measured at 15 degrees Celsius.

At the time of application, the weather shall be warm and dry, and the road surface clean and dry and preferably warmed by the sun.

After the application of the primer a period of at least twelve hours, and preferably 2 or 3 days, shall elapse before the surface seal coat is applied. During this period traffic shall be kept off the treated surface by means of adequate barriers, lights, etc. Any failures or deficiencies in the primed surface shall be made good by hot mix patching, re-priming or any other approved methods.

In locations requiring the passage of traffic or where directed by the Superintendent, primed surfaces shall be gritted. At least two hours shall elapse between application of primer and grit unless otherwise directed.

L.13 WIDTH TO BE PRIMED OR PRIMERSEALED

Where possible the width of the prime or primerseal shall extend 100 mm outside the edges of the proposed final treatment.

L.14 BITUMINOUS SEAL FIRST COAT

After priming has been carried out and the period provided for above has elapsed, all dirt or foreign matter shall be removed from the prime pavement and the first seal coat applied. The fluxed and cut-back bitumen shall be applied at a temperature in accordance with Table L.11.2. at the correct uniform rate - see Section 408.07 of the VicRoads specification., this quantity being as measured at 15 degrees Celsius.

HP Prior to the commencement of work, the contractor shall submit the rates of application for review by the Superintendent.

At the time of application, the weather shall be warm and dry and the road surface shall be clean and dry and preferably warmed by the sun. The Superintendent may order that the rate of application of bitumen be increased if he considers that the surface texture of the primed pavement is such that a heavier application is necessary.

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L.15 ADHESION AGENTS

The Superintendent may direct that an approved adhesion agent is to be used.

Adhesion agent shall be added to the binder in the proportion of one part by volume of adhesion agent to 200 parts of bitumen at 16 degrees Celsius where the pavement is damp and showery conditions associated with high humidity are prevailing or expected or where the aggregate is saturated with water.

All damp to wet aggregates shall be precoated by spraying with a solution of one part of adhesion agent to 100 parts of diesel fuel oil.

Adhesion agent shall be added gradually to the binder or fuel oil as specified above. The mixture shall be thoroughly circulated for a period of at least 20 minutes to ensure even distribution of the adhesion agent.

Adhesion agents shall be used strictly in accordance with the manufacturers recommendations.

L.16 PRECOATING OF AGGREGATE

Aggregate shall be coated with a film of diesel fuel oil before it is applied to the road surface.

The precoating material (diesel fuel oil and 1% anti strip) shall be sprayed onto the aggregate at a uniform rate (as a guide between 8 and 12 litres per cubic metre for basaltic and between 5 and 8 litres per cubic metre for granite aggregate) and the aggregate shall be thoroughly mixed so that the entire surface of each stone is oil damp, without "over oiling".

L.17 APPLICATION OF AGGREGATE

Immediately after spraying the first seal coat, precoated aggregate consisting of screenings of the type specified shall be uniformly and evenly distributed over the treated surface from an approved "cockerell" or fish tail type spreader.

The application of the screenings shall follow immediately after the spraying of the binder. All bituminous spray shall be covered with aggregate within the times as set out below:-

Air Temperature	Maximum Covering Time
15-20 degrees Celsius	10 minutes
20-25 degrees Celsius	15 minutes
25+ degrees Celsius	20 minutes

L.17 APPLICATION OF AGGREGATE (cont'd)

As soon as practicable after the application of the screenings, the treated surface shall be rolled with approved self propelled pneumatic tyred multi wheeled rollers having a mass not less than 8 tonnes and capable of being ballasted up to 12 tonnes with tyres of equal size. Rear wheels shall be offset relative to the front wheels to give overlapping tyre paths and complete coverage for the effective width of the roller. Tyres shall be inflated to 600 kPa.

Rolling will consist of at least 6 passes with an approved roller. The Rolling speed shall be between 15 and 25 km/h. Rolling shall continue until the aggregate is embedded in the binder and a uniform surface obtained.

Rolling shall be carried out such that every 4000 m^2 of seal/primerseal receives a minimum continuous rolling of four roller hours within two hours of the binder being sprayed.

The number of rollers to be used shall be at least one for each 10,000 metres square or part thereof of primer sealing or sealing to be done in one day. An approved drag broom drawn by a pneumatic tyred truck or approved tractor, with associated hand brooms where necessary, shall be used to ensure uniform distribution of the screenings.

L.18 BITUMINOUS SEAL, SECOND OR FINAL COAT

After the road has been subjected to normal traffic for a sufficient period to ensure the embedding of the aggregate in the first coat of binder to satisfaction of the Superintendent a second or final seal coat shall be applied. The road shall be first swept to remove any surplus screenings from the first coat and the fluxed cutback bitumen as specified shall be applied at temperature in accordance with Table L.11.2 at the correct uniform rate - see Section 408.07 of the VicRoads specification, this quantity being as measured at 15 degrees Celsius.

HP Prior to the commencement of work, the contractor shall submit the rates of application for review by the Superintendent.

At the time of application the road surface shall be clean and dry and preferably warmed by the sun.

The binder shall be covered with aggregate, of the type specified for the purpose, applied at the design application rate.

The aggregate shall be applied and the road rolled as specified under Section L.17 above.

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L.19 PREPARATION OF PAVEMENTS FOR PRIMERSEALS

Where primerseals are used, preparation of the pavement for primersealing shall be as specified in L.8 and L.9 of this specification.

If the pavement is dry and produces dust it shall be lightly watered before sweeping.

L.20 PRIMERSEAL COAT - BINDER AND AGGREGATE

Unless otherwise specified all primerseals shall be SP1000 or equivalent.

The spraying temperature shall be in the range of 115 degrees Celsius to 135 degrees Celsius. At the time of application the road surface shall be damp.

NOTE: In all cases where primerseals are applied, they shall be covered with a first coat seal or asphalt not sooner than three (3) months nor longer than twelve (12) months from the time of spraying the primerseal coat.

L.21 WEARING COURSE PROTECTION - REFLECTIVE CRACKING

Where cement has been used, whether in combination with other additives or by itself, in any layer of the pavement such as in cement treated fine crushed rock or in stabilised subgrade, a membrane must be used to prevent reflective cracking of the wearing course.

The type of membrane may be one in which bitumen emulsion, glass fibre and aggregate is applied as an emulsion primerseal prior to an asphalt or first seal coat wearing course, or as a geotextile reinforced seal applied to a primed base course prior to applying the first seal coat.

HP The type of the proposed membrane application shall be subject to approval by the Superintendent prior to its use.

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L.22 CLEANING UP

Any tar or bituminous materials which may, from time to time, for any reason, come in contact with kerbs, channels or nature strips, shall be cleaned off to the satisfaction of the Superintendent.

The Contractor shall remove the excess aggregate from the pavement, pits, kerb and channel and concrete paving by brooming it off on to the unsealed shoulder or by use of a suction cleaner. Excess aggregate shall not be removed until the aggregate has properly bedded down into the binder by either trafficking or additional rolling, and shall be removed from 6 hours to 48 hours of being sealed or primersealed unless otherwise instructed. If a suction cleaner is used, it shall remove aggregate by suction only. No more than 40 loose stones in any square metre of pavement shall remain after the removal of excess aggregate.

Any damage done to the seal due to the removal of excess aggregate shall be repaired by the Contractor at no cost to Council.

L.23 SALVAGED SCREENINGS

Surplus screenings which have been removed from the road as specified above SHALL NOT BE USED UNDER ANY CIRCUMSTANCES in any subsequent sealing works but shall be disposed of to the satisfaction of the Superintendent.

L.24 SUSPENSION OF WORKS

Bituminous surfacing shall be suspended immediately if, in the opinion of the Superintendent, weather conditions, working practices or any other circumstances are such that a satisfactory result will not be achieved.

L.25 TESTING AND ACCEPTANCE

(a) **Samples**

When requested by the Superintendent at any time during the Contract, the Contractor shall provide up to three (3) one litre samples of each bituminous material required under the Contract.

(b) **Tests**

The Contractor shall provide certification of specification compliance for each delivery of primer, primerbinder or binder supplied to the work site.

All tests shall be conducted in accordance with VICROADS relevant test method and Codes of Practice.

L.25 TESTING AND ACCEPTANCE (cont'd)

(c) **Inspection**

Prior to the Contractor leaving the site, the work shall be jointly inspected by the Superintendent and the Contractors representative to identify any defects in the work requiring immediate rectification to avoid rapid deterioration of the road surface or danger to road users.

(d) **Acceptance of Work**

Further to the provisions of Clause L.25(c) and Clause 30 of the General Conditions of Contract, work shall be assessed in accordance with Tables L.25.1 and L.25.2.

Table L.25.1 - Application of Bituminous Material

Variation from the design rates of application *	Assessment
Not more than 0.05 $1/m^2$ below or 0.1 $1/m^2$ above.	Accept
Between 0.05 $1/m^2$ and 0.1 $1/m^2$ below or between 0.1 $1/m^2$ and 0.15 $1/m^2$ above.	Contractor to rectify work as directed by the Superintendent at no cost to Council as applicable, or alternatively, work will be accepted at 90% of the scheduled rates.
Between 0.1 $1/m^2$ and 0.21$/m^2$ below or between 0.15 $1/m^2$ and 0.25 $1/m^2$ above.	Contractor to rectify work as directed by the Superintendent at no cost to Council as applicable, or alternatively, work may be accepted at a rate fixed by the Superintendent which shall not exceed 70% of the scheduled rates.
More than 0.2 $1/m^2$ below or 0.25 $1/m^2$ above.	Work shall be rejected in accordance with Clause 30.3 of the General Conditions of Contract - materials and work not complying with the Contract.
* For modified binders, variation from specified rates of application may be increased or decreased by an additional 0.05 $1/m^2$ from these shown in Table L.25.1.	

L.25 TESTING AND ACCEPTANCE (cont'd)

Table L.25.2 - Application of Aggregate

Variation from the design rates of application	Assessment
Not more than 10% above or 5% below.	Accept
More than 5% below.	Contractor to rectify work as directed by the Superintendent at no cost to Council.
More than 10% above.	The cost of aggregate used in excess of 10% above the amount required to meet the design rate of application shall be borne by the Contractor or if directed replaced by the Contractor at no cost to Council.