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1. Scope

- 1.1 Austroads Technical Specification ATS 3460 sets out the requirements for the design and application of sprayed bituminous surfacing or resurfacing.

2. Definitions

- 2.1 In addition to the definitions and descriptions set out in AS 3568, AP-C87-15 and AGPT04K-18, the following definitions apply to this Specification:

Defect: Includes emulsification, flushing, bleeding, fatty areas, significant areas of bitumen on kerb and channel, excess bitumen without aggregate cover at the start/finish of runs, aggregate stripping, loose aggregate in excess of the specified amounts, non-uniform aggregate spreading, streaking of aggregate and a failure to achieve the surface texture, design binder application or aggregate retention specified in Clause 12.

Sprayed Sealing Work: Includes primes, initial seals and seals constructed using bituminous binders.

Surface Pre-Treatments: Any sprayed bitumen, aggregate, combination of sprayed bitumen and aggregate, or other approved treatment.

3. Referenced Documents

- 3.1 The following documents are referenced in this Specification or are relevant to this Specification:

Australian /New Zealand Standards

AS 1160	Bituminous emulsions for the construction and maintenance of pavements
AS 2008	Bitumen for pavements
AS/NZS 2106.1	Methods for the determination of the flash point of flammable liquids (closed cup) Abel closed cup method
AS 2106.2	Methods for the determination of the flash point of flammable liquids (closed cup) Determination of flash point - Pensky-Martens closed cup method
AS 2157	Cutback bitumen
AS 3568	Oils for reducing the viscosity of residual bitumen for pavements
AS 3705	Geotextiles - Identification, marking and general data
AS 3706	Geotextiles – Methods of Test

Austroads (available from: <https://austroads.com.au/publications>)

AGPT-T101	Method of sampling polymer modified binders, polymers and crumb rubber.
AGPT-T250	Modified Surface Texture Depth (Pestle Method)
AGPT-T254	Stripping of Aggregate from Sprayed Seals
AP-T262-19	Performance Requirements for Bitumen Sprayers
AGPT-T530	Calibration of Bitumen Sprayers: General Introduction and List of Methods
AGPT-T531	Calibration of Bitumen Sprayers: Volumetric Calibration of Bitumen Pumps
AGPT-T532	Calibration of Bitumen Sprayers: Transverse Distribution by Fixed Pit Facility
AGPT-T533	Calibration of Bitumen Sprayers: Transverse Distribution by Field Mat
AGPT-T534	Calibration of Bitumen Sprayers: Transverse Distribution by Portable Trough
AGPT-T535	Road Speed Calibration
AP-C87-15	Austroads Glossary of Terms
AP-G41-15	Bituminous Materials Safety Guide
AGPT04K-18	Guide to Pavement Technology Part 4K: Selection and Design of Sprayed Seals
ATS 3110	Supply of Polymer Modified Binders

Australian Asphalt Pavement Association (AAPA)

AAPA Advisory Note No. 7 Guide to the Heating and Storage of Binders for Sprayed Sealing
 AAPA HSE Guide No.8 Environmental Management When Spraying Bituminous Materials

ASTM International

ASTM D6140 Standard Test Method to Determine Asphalt Retention of Paving Fabrics used in
 Asphalt Paving for Full-Width Applications

4. Quality System Requirements

- 4.1 The Contractor must prepare and implement a Quality Plan that includes detailed procedures, Inspection and Test Plans and / or associated documentation for the following:
- a) Design of appropriate rates of application to achieve the desired surface characteristics.
 - b) Achievement of cutter proportions.
 - c) Achievement of a homogeneous binder mixture
 - d) Elimination of tank contamination.
 - e) Control of binder temperature.
 - f) Ensuring even and accurate binder and aggregate applications.
 - g) Ensuring adequate cure of the treatment prior to any subsequent treatment.
 - h) Sampling and testing of materials.
 - i) The achievement of a homogeneous product that can be sprayed as a uniform application of binder across the pavement, free of streaking. Details that must be included as a minimum are recommended spray nozzle sizes, maximum width of sprayer runs, ensuring a uniform application of binder across the joint between sprayer runs.
 - j) Materials Technical Data sheets for each product.
 - k) Protection of road furniture and roadside facilities.
 - l) Mitigating the risk of bituminous material wash-off and environmental impacts in the event of rain or other events.
 - m) Provision of Records.

In addition to the above, for Emulsions, Polymer Modified Binders and Crumb Rubber:

- n) Management of curing process for emulsion, including traffic management for emulsions.
- o) Ensuring compatibility of emulsion primers with the pavement material including any additives or modifiers and the achievement of stated curing times.
- p) The manufacturer's recommendations regarding:
 - i) handling instructions including storage and spraying temperature range;
 - ii) maximum storage time and temperatures;
 - iii) maximum heating temperature and heating rate,
- q) Transportation of Polymer Modified Binder, including storage times and temperatures

Aggregate:

- a) Storage of aggregate to maintain separation between individual lots.
- b) Controlling loading to avoid contamination.
- c) Removal of dust and dirt.
- d) Application of precoat.
- e) Methods to monitor, manage, mitigate or eliminate pollution or environmental impacts of pre-coated aggregate stockpile (refer also to the Contractor's Environment Management Plan).
- f) Application of aggregate including the measurement and assessment of aggregate spread rates.
- g) Rolling of aggregate including minimum rolling times, roller types and roller weights.
- h) Sweeping and removal of loose aggregate.

Maintenance of the seal:

- a) Undertaking and reporting of inspections.
- b) Management and repair of a Defective seal.

HOLD POINT 1.

Process Held	Commencement of sprayed sealing works under this Contract.
Submission Details	The Quality Plan must be provided at least 14 days prior to the commencement of the sprayed sealing works under this Contract.

5. Program of Work

5.1 The Contractor must provide a detailed program of sprayed sealing work as follows:

Where the sprayed seal is part of a contract for periodic resurfacing or road maintenance:	At least 2 weeks prior to the commencement of the sprayed sealing works under this contract.
Where the sprayed seal is part of a contract for the construction of a road:	The program must be included in the Contract / Construction Program.

5.2 While sprayed sealing work is underway, the Contractor must:

- a) prepare a weekly update of the program and provide it to the Principal prior to the Thursday preceding the execution of the work in the following week; and
- b) provide at least 2 weeks prior notice of any significant changes to the detailed program that was submitted in accordance with Clause 5.1.

HOLD POINT 2.

Process Held	Commencement or continuation of sprayed sealing works under this Contract
Submission Details	The detailed program of sprayed sealing work must be provided in accordance with the Clauses 5.1 and 5.2.

6. Materials

Bituminous Binder, Aggregate and Related Products

- 6.1 Bituminous binder, aggregate and related products used for sprayed sealing must comply with Table 6.1. Copies of the specifications referred to can be obtained from the relevant agency internet site.

Table 6.1: Supply of Binder, Aggregate and Related Products

Jurisdiction where the seal is to be applied	Product	Applicable Specification or requirement
Queensland	Bitumen	TMR: MRTS17
	Cutback Bitumen	TMR: MRTS20
	Bituminous Emulsion	TMR: MRTS21
	Polymer Modified Binder (including crumb rubber)	TMR: MRTS18
	Cutter Oil	MRTS19
	Aggregate	TMR: MRTS22
	Geotextile	TMR: MRTS57
	Aggregate precoating agent	TMR registered product
	Bitumen adhesion agent	TMR registered product
New South Wales & ACT	Bitumen for Pavements	TfNSW 3253
	Bitumen Emulsion	TfNSW 3254
	Aggregate Precoating Agent	TfNSW 3258
	Bitumen Adhesion Agent	TfNSW 3259
	Cutback Bitumen	TfNSW 3261
	Aggregate	TfNSW 3151
Victoria & Tasmania	Cutback Bitumen	AS 2157
	Bitumen Emulsion	AS 1160 ⁽²⁾ ⁽³⁾
	Bitumen	AS 2008 ⁽¹⁾ ⁽²⁾
	Bitumen Adhesion Agent	Proprietary product ⁽³⁾
	Cutter	High Flash Point cutter must be used.
	Aggregate Precoating Material	Distillate or distillate based product, cutback bitumen, emulsion based product or proprietary product ⁽³⁾
	Aggregate	VicRoads Standard Sections 801, 831 and 832
New Zealand	Bitumen	NZTA M01
	Aggregates	MZTA M06
South Australia	All Products	RD-BP-D2 Design and Application of Sprayed Bituminous Surfacing
Western Australia	All Products	Specification 511 Materials for Bituminous Treatments
Northern Territory	All Products	DIPL Standard Specification for Roadworks: Section 8. Spray Sealing
All	Polymer Modified Binder	ATS 3110 ⁽³⁾
	Cutter	AS 3568

Notes:

1. For C170, the value for the long-term effect of heat and air must not be less than nine days.
2. Bitumen incorporating up to 5% (five parts) of crumb rubber is considered to be an unmodified bituminous binder. Bitumen incorporating manufactured polymers that provide a similar level of modification may also be considered to be unmodified binders, subject to the approval of the Principal.
3. In Victoria and Tasmania, the use of a proprietary product is subject to the Contractor providing evidence that the proprietary product has demonstrated satisfactory field performance for a period of at least 3 years. Restricted use of untried products at nominated trial sites is subject to the approval of the Superintendent.

Geotextile Fabric

- 6.2 Unless specified otherwise in a reference listed in Clause 6.1, geotextile fabric used with a sprayed seal must:
- a) be tested in accordance with AS 3706 to demonstrate compliance with the design requirements and this Specification;
 - b) be identified in accordance with AS 3705;
 - c) be a non-woven needle punched fabric;
 - d) for seals of nominal maximum size of 14 mm and under have a minimum fabric mass of 135 g/m²;
 - e) for seals of nominal maximum size of larger than 14 mm have a minimum fabric mass of 175 g/m²;
 - f) enable bitumen to be retained at a rate of at least 0.9 l/m² when tested in accordance with ASTM D6140; and
 - g) when tested in accordance with AS 3706, have a melting point at least 10°C above the maximum binder spraying temperature.

Measurement of Materials

- 6.3 Unless otherwise stated, a rate or quantity of binder under this Specification relating to C170, C240, C320, M500, Cutback Bitumen, PMB, Crumb Rubber, Emulsion refers to measurement by volume at 15°C.
- 6.4 Where the volume of such materials is measured at a higher temperature, the Volume Conversion Formulae must be used for converting the measured volume to a volume at 15°C.
- 6.5 Rates and quantities relating to volume of aggregate refer to loose volume.

7. Design

General

- 7.1 The Contractor is responsible for:
- a) the design of the sprayed seal treatment;
 - b) inspection of each site and making any adjustment necessary to the design to account for site conditions at the time of application; and
 - c) application of the sprayed seal treatment.
- 7.2 Notwithstanding that the Principal may specify some details of the sprayed seal design, (such as aggregate size, treatment type and geotextile grade) the Sprayed Seal must comply with the surface texture and aggregate retention requirements set out in Clause 12 at all times prior to the expiry of the Defects Liability Period.
- 7.3 Where the Contractor considers that an alternate treatment than that stipulated by the Principal (if any) will be required to meet the performance requirements of this Specification, an alternate treatment design must be submitted 14 days prior to the work commencing, stating the reasoning for the selection of the proposed treatment.
- 7.4 Unless specified otherwise, the design must be in accordance with AGPT04K-18 and any specific jurisdictional supplementary requirements. The design calculation must clearly show how design rates have been determined, including all traffic and EHV allocations to each lane, voids factors, allowances, assumptions and any supporting data.

7.5 Application rates must be expressed in accordance with Table 7.5:

Table 7.5: Units for Measurement of Materials

Material	Unit
Bituminous	L / m ² (residual @ 15°C)
Aggregates	m ² / m ³

7.6 Any traffic counts supplied by the Principal may not take into account seasonal or temporary increases in traffic. Where necessary the Contractor must allow for such variations in the seal design.

Binders for Initial Treatments

- 7.7 The binder to be used in an Initial Treatment must be a suitable cutback bitumen or a bitumen emulsion. Lightly modified binders (such as S35E (PBD), or a blend of class 170 bitumen and up to 10 parts of crumb rubber) may be used, subject to the prior approval of the Principal.
- 7.8 The binder used for a Prime must be capable of penetrating into the pavement surface and when cured, be of uniform appearance and capable of providing a strong bond between the bituminous surface and the pavement
- 7.9 An Initial Seal must be waterproof and capable of adhering to the pavement surface while retaining sufficient binder on the surface to hold the aggregate in place. The class of binder used must be suitable for the proposed application (including traffic loading, environmental conditions and pavement material porosity) and pavement construction methodology and program (including the curing time between bituminous treatments).

Binders for Secondary Treatment and Retreatment

- 7.10 Unless specified otherwise in the Contract documents, one of the binder classes and seal sizes outlined in Table 7.10 must be used.

Table 7.10: Binder Classes and Seal Sizes

Treatment Type	Binder Class	Seal Type	Typical Aggregate Sizes
Conventional	C170, C240	Single/single Double/double	7, 10, 14 10/5, 10/7, 14/7, 20/7, 20/10
HSS	S10E, S35E, S15E, A blend of C170 bitumen and 10 parts crumb rubber	Single/single Double/double	7, 10, 14 10/5, 10/7, 14/7, 20/7, 20/10
XSS	S20E, S15RF S45R	Double/double	14/7, 20/7, 20/10
SAM	S15E, S20E, S45R, S15RF	Single/single Double/double	10, 14 10/5, 10/7, 14/7, 20/7, 20/10
SAMI	S25E, S18RF	Single/single Double/double	10, 14
GRS as SAM	C170, C240, S35E, S10E, S20E, A blend of C170 and 10 parts crumb rubber, S45R, S15RF	Double/double	14/7, 20/7, 20/10
GRS as SAMI	C170, C240, S35E, S10E, S20E, A blend of C170 and 10 parts crumb rubber, S45R, S15RF	Single/single	10, 14

Note: The Contractor may submit a proposal to the Principal for the use of bitumen emulsions for all treatment types.

HOLD POINT 3.	
Process Held	Commencement of sprayed sealing work for each site.
Submission Details	The design must be provided at least 14 days prior to the commencement of the spray sealing work for each site.

8. Stockpile Sites

- 8.1 If the Principal has provided stockpile sites, these are not guaranteed as suitable for the Contractor's operations or that they are of sufficient capacity to accommodate any or all of the quantities needed by the Contractor.
- 8.2 Any stockpile sites used by the Contractor during the Contract must be cleaned and returned to their original condition within four weeks of completion of the use of that stockpile site for works under this contract. Where the Contractor does not clean any stockpile site used as specified, the Principal may arrange for it to be done by others at the Contractor's expense.
- 8.3 Unless specified otherwise, additional stockpile sites are not to be constructed on the road reserve.
- 8.4 The use of stockpile sites on other road reserves (such as municipal stockpile sites), or on other public or private land requires the approval of the relevant authority or owner prior to use for work under this Contract.
- 8.5 The following requirements apply to the placement of aggregate and materials:
 - a) stockpiles must be so placed that they do not unduly reduce sight distance at locations such as intersections and curves;
 - b) stockpiles must not be placed under or immediately adjacent to power lines and must comply with all "No Go Zones" and the relevant requirements for spotters;
 - c) stockpiles must not be placed under trees or structures where the overhead clearance would interfere with aggregate loading and off-loading operations;
 - d) stockpiles must be placed clear of the road formation, drains, gateways and side tracks and the toes of the stockpiles must be not less than 1 m from any obstructions which could impede the operation of mechanical loading equipment.

9. Application of Bituminous Material

General

- 9.1 The extent of work comprises of the sprayed sealing of the following areas (as applicable):
 - a) between the nominated start and finish chainages;
 - b) as shown on the drawings; and
 - c) as marked on the pavement surface.
- 9.2 The work also includes any side road that has been marked on the pavement surface, existing tapers, bell mouths at intersecting roads, pavement widenings (turn lanes), traffic lanes and sealed shoulders.
- 9.3 The handling, storage, transport, heating and transfer of binders must comply with the requirements and practices outlined in AP-G41 and AAPA Advisory Note 7.
- 9.4 Any seal dimensions specified do not allow for additional binder or paving geotextile required for overlaps.

- 9.5 The site must be kept in a neat and tidy condition at all times. Waste, including unused contractor supplied aggregate, bitumen, empty containers or other materials remaining after completion of the work must be removed from the site by the Contractor at the completion of the work. Disposal of these materials must comply with all environmental requirements and applicable legislation.
- 9.6 The work must be set out so that longitudinal joins coincide with lane lines, unless otherwise specified in the Contract. Tapers may be sprayed separately.
- 9.7 If requested by the Principal, the Contractor must prepare diagram(s) showing the proposed spray plan for intersections and junctions.

HOLD POINT 4.	
Process Held	Commencement of sprayed sealing work at intersections and junctions
Submission Details	If requested by the Principal, the proposed spray plan must be provided at least 2 working days prior to the commencement of the sprayed sealing work at intersections and junctions

Site Preparation

- 9.8 The Principal may have specified pretreatment of the existing surface. However, the Contractor must determine whether further pretreatment is required to achieve the requirements of this Specification and apply any further pretreatment at its own cost.
- 9.9 The Contractor must prevent bituminous material entering or adhering to gratings, hydrants or valve boxes, inspection pit covers, kerbs and other road fixtures. The Contractor must rectify any such damage.
- 9.10 The pavement must be clean and free of loose material. The cleaning must not damage the existing surface.
- 9.11 The moisture content of the pavement must (as applicable):
- Reseals: not adversely affect the performance of the sprayed seal.
 - Primes: permit the primer to be absorbed into the base.
 - Initial seals: permit the binder to be absorbed or adhere to the base in a uniform binder film.
- 9.12 The surface to be prepared includes the surface to be sprayed plus either an area which is a minimum of 250 mm beyond the surface to be sprayed, or one which extends to the edge of the formation, whichever is the lesser.
- 9.13 The Contractor must remove all raised pavement markers, and pavement markings as specified by the Principal prior to sealing and undertake any necessary repair to the existing seal.

Weather Conditions

- 9.14 Sprayed bituminous treatments must not be applied during rain.
- 9.15 The Contractor must not apply any sprayed bituminous treatments unless the air and pavement temperatures are above those listed in Table 9.16 and rising. The minimum temperature does not apply for SAMI treatments which will not be trafficked prior to the SAMI being overlaid.
- 9.16 In addition to the limitations in Table 9.16, priming and initial sealing may only be undertaken when the prevailing weather conditions have a risk rating of 'low' or less and appropriate work practices to minimise risks are in place. The assessment of weather conditions must be in accordance with AAPA Guide No.8 and/or any specific jurisdictional requirements.

Table 9.16: Minimum Air and Pavement Temperature

Treatment Type	Minimum Air and Pavement Temperature (°C)
Initial Treatments	
Primes	10
Initial Seals (single/single)	15
Initial Seals (double/double)	10
Reseal Treatments	
Bitumen and Crumb Rubber Binders	15
PMBs	20
Geotextile reinforced seals	20

Initial Treatment

- 9.17 For granular pavements, the application of the Initial Treatment must not commence until the moisture content and hardness requirements specified in the Contract have been achieved.
- 9.18 Where slow absorption of the prime causes interference with traffic or the application of binder, or at an intersection where traffic must cross the new prime, the Contractor must apply approved cover material evenly over the primed surface. This material must be removed prior to application of the next bituminous treatment.

Application of Binder

- 9.19 The application temperatures for primes and binders must comply with Table 9.19.

Table 9.19: Application Temperatures

Product	Uncut		Cut	
	Minimum Spraying Temp (°C)	Max Re-heating Temp (°C)	Minimum Spraying Temp (°C)	Max Re-heating Temp (°C)
AMC 00	10	30	na	na
AMC 0	35	55	na	na
AMC 1	60	80	na	na
AMC 2	75	100	na	na
AMC 3	95	115	na	na
AMC 4	110	135	na	na
AMC 5	120	150	na	na
AMC 6	135	160	na	na
AMC 7	150	175	na	na
C170, C240, C320 and M500 ⁽¹⁾	175	200	Resultant	200
PMB ⁽²⁾	190	200	185	200
Crumb Rubber	185	200	175	200
Emulsion	Manufacturer's recommendation	Manufacturer's recommendation	na	na

Notes:

- For cut C170, C240, C320 and M500, the binder must be heated to at least 185°C, additive and/or cutter added and then sprayed at the resultant temperature.
- Minimum and maximum temperature for PMBs (and factory blended crumb rubber modified binders) must be consistent with the manufacturer's recommendations.

- 9.20 Prior to the application of the binder, the Contractor must verify that:
- a) the surface of any unstabilised granular pavement to be primed or sealed meets all specified requirements, such as hardness, moisture content and roughness;
 - b) marked guide lines have been set out correctly;
 - c) the surface to be sealed is swept and clean;
 - d) minimum and maximum temperature for PMBs (and factory blended crumb rubber modified binders) must be consistent with the manufacturer's recommendations;
 - e) for multiple application treatments, intermediate seal layers are thoroughly swept to ensure that loose aggregate particles are removed prior to the application of the subsequent seal layers (including areas where an overlap of aggregate has occurred during the spreading operation);
 - f) measures are in place to protect roadside furniture;
 - g) where required, appropriate environmental controls are in place to mitigate the risk of binder wash-off;
 - h) all traffic management is in place; and
 - i) sufficient binder and aggregate are available for the programmed work to be completed.
- 9.21 Adhesion agent may be added to the binder to promote adhesion to the cover aggregate and/or pavement surface. Where adhesion agent is added to the binder, the total volume of adhesion agent must not exceed 1% by mass of the binder.
- 9.22 Except for SAMI seals and the bond coat for geotextile reinforced seals, cutter oil may be added to the binder.

HOLD POINT 5.	
Process Held	Application of binder
Submission Details	Notification that the surface is ready and supporting test results must be provided at least 2 working days prior to the commencement of the application of binder.

Application of Strain Alleviating Membrane Interlayer

- 9.23 Where the SAMI seal is covered with asphalt during the same shift, the SAMI seal must not contain cutter. Where the SAMI seal is left exposed for at least 1 day, the amount of cutter in a SAMI binder is limited to a maximum of 2 parts.
- 9.24 If the temperature of the pavement surface on which the SAMI is to be placed is below 20°C, the Contractor must implement measures to ensure that there is no detrimental effect on the performance of the SAMI.

Bitumen Sprayer Requirements

- 9.25 All sprayers used for application of bituminous materials must have a current Certificate of Calibration showing compliance with the Austroads Sprayer Calibration Procedures series AGPT-T530 to AGPT-T535. The Certificate of Calibration must not be older than 12 months.
- 9.26 Binder volumes must be determined by dip stick measurement unless the use of an alternative method of volume determination has been approved by the Principal.
- 9.27 Hand spraying will only be permitted when the use of a mechanical sprayer is not practicable.
- 9.28 Works must be performed so that at the start and end of each sprayer run a straight line is produced with no gaps or overlap between adjacent run sprayer runs.

10. Placement of Paving Geotextile

- 10.1 Where the use of paving geotextile is specified, it must be placed in accordance with the manufacturer's instructions, any requirements specified elsewhere in the Contract and the following:
- a) traffic must not be permitted to travel on the paving geotextile where this will cause damage to or pick up of the paving fabric;
 - b) any folds, creases and/or wrinkles in the paving geotextile that will impact the performance of the seal must be removed;
 - c) overlap of the paving geotextile on longitudinal joints must be between 100 and 150 mm;
 - d) longitudinal overlap of the paving geotextile must be placed within 200 mm of the centreline or lane line;
 - e) additional binder must be applied at the longitudinal overlap to avoid the seal stripping along the joint;
 - f) the paving geotextile must be bonded to the pavement with a bond coat sprayed wide enough to ensure the full bond coat application is achieved over the entire width of the fabric;
 - g) appropriate jets must be used to ensure the specified bond coat rate is applied across the entire width of paving geotextile; and
 - h) the construction practices used to place the paving geotextile must not cause undue migration of the underlying bond coat into the paving geotextile.
- 10.2 A certificate of compliance for the paving geotextile must be included with the respective Lot data.

11. Application of Aggregate

Precoating

- 11.1 Aggregate must be either plant precoated or field precoated. Aggregate precoating must be undertaken using a purpose-built item of plant to apply the precoating material in a controlled manner that produces a uniform coating.
- 11.2 Precoated aggregate may be stockpiled, provided that the Contractor implements measures to ensure that contamination does not occur.

Aggregate Spreading and Rolling

- 11.3 Unless impracticable, aggregate must be spread in a single uniform layer at the target aggregate spread rate.
- 11.4 Rolling must:
- a) commence immediately after aggregate spreading has commenced;
 - b) be undertaken over the full width of the pavement being sealed including any untrafficked areas, and
 - c) be undertaken by rubber tyred rollers or rubber coated drum rollers.

Removal of Loose Aggregate After Rolling

- 11.5 After the completion of a seal treatment, the Contractor must remove and dispose of all loose aggregate within the maximum time limits specified in Table 11.5. This includes loose aggregate on all trafficked areas, and areas where loose aggregate has been swept, or moved by traffic onto sealed shoulders or non-trafficked areas, or into other areas such as concrete channels, traffic islands, medians, open drains, drainage pits, footpaths, nature strips, or verges.

Table 11.5: Maximum Aggregate Removal Times

Traffic Volume (AADT)*	Maximum Time Limit
>5000 and all Freeways	Within 8 hours of sealing
2000 to 5000	Within 24 hours of sealing
≤ 2000	Within 48 hours of sealing

* Annual Average Daily Traffic

- 11.6 All loose aggregate must be removed clear of the edge of the seal. Loose aggregate only must be removed, and without disturbance of the embedded aggregate. Damage to the seal resulting from the removal of loose aggregate must be rectified by the Contractor.
- 11.7 Where the pavement has kerb and gutter, the loose aggregate must be picked up and removed from the site.
- 11.8 The Contractor must ensure that loose aggregate does not present a traffic hazard. The number of loose aggregate particles in any square metre during the Defects Liability Period must not exceed the limits in Table 11.8. This includes stones that have originated from the area sealed under the Contract and which have accumulated on adjacent sealed areas such as intersections, additional traffic lanes (in either direction), shoulders, and flanks.

Table 11.8: Maximum Loose Aggregate Count

Aggregate Size	Maximum loose aggregate count per square metre
7 mm	60
10 mm & larger	40

- 11.9 If the number of loose stones exceeds the maximum values warning signs must be erected within 24 hours and the surface swept within 48 hours (or such other times specified by the Principal). The warning signs must advise of loose stones and slippery conditions. A speed limit in accordance with jurisdictional requirements must also be applied.

12. Acceptance of Work

General

- 12.1 The Contractor must apply a sprayed seal which achieves the design binder application rate, surface texture and aggregate retention within the tolerances for “Conforming” work specified in this Clause 12. However, where the work which is outside of the criteria specified for Conforming work, that work may be classified as a “Conditionally Conforming” Lot. Where specified elsewhere in the Contract documents, reduced payment, or additional testing requirements, will apply to Conditionally Conforming work.

Rates of Application for Binder

- 12.2 The Contractor must produce evidence to show that the actual rate of application for a particular job (or segments of a job with different design rates of application) complies with the design rates of application.
- 12.3 Variation between the actual rates and the design rates will be assessed in accordance with Table 12.3.

Table 12.3 Variations from Design Binder Application Rate

Variations from design binder application rate	Classification
≤ 0.1 l/m ² below the design	Conforming
> 0.1 l/m ² below the design	Conditionally Conforming, subject to requirements for surface texture and aggregate retention being met.

- 12.4 The variation from the Design Rate of Application for a SAM or SAMI may be increased by 0.05 l/m².
- 12.5 For double / double seals and geotextile seals, the above tolerances apply to the combined rate for the bond coat, bottom and top binder applications.

Surface Texture

- 12.6 An initial assessment of Texture Depth will be made visually. The Principal may direct that nominated areas are tested using AGPT-T250 (or an equivalent test method specified elsewhere in the Contract).
- 12.7 Unless alternative values are specified elsewhere in the Contract, the values specified in Table 12.7 will be used to determine whether the Texture Depth is Conforming, Conditionally Conforming or Non-conforming.

Table 12.7: Surface Texture Depth Requirements ⁽¹⁾

Seal Treatment	Mean Texture Depth (mm)				
	Non-conforming	Conditionally Conforming ⁽¹⁾	Conforming	Conditionally Conforming ⁽¹⁾	Non - conforming
Single / Single Seal Treatments					
Size 5	< 0.8	0.8 to < 1.0	1.0 to 1.6	> 1.6 to 1.8	> 1.8
Size 7	< 1.2	1.2 to < 1.3	1.3 to 1.8	> 1.8 to 2.0	> 2.0
Size 10	< 1.3	1.3 to < 1.5	1.5 to 2.5	> 2.5 to 3.0	> 3.0
Size 14	< 1.7	1.7 to < 2.0	2.0 to 4.0	> 4.0 to 4.5	> 4.5
Double / Double Seal Treatments					
Size 10/5	<1.1	1.2 to < 1.3	1.3 to 2.1	> 2.0 to 2.3	>2.3
Size 10/7	<1.1	1.2 to < 1.3	1.3 to 2.2	> 2.1 to 2.4	>2.4
Size 14/5	<1.2	1.2 to < 1.3	1.3 to 2.4	> 2.4 to 2.7	>2.7
Size 14/7	<1.2	1.2 to < 1.3	1.3 to 2.4	> 2.4 to 2.7	>2.7
Size 20/7	<1.3	1.3 to < 1.4	1.4 to 2.5	> 2.5 to 2.8	>2.8
Other Treatments ⁽²⁾					
Initial Seal - Size 7	< 1.0	NA	1.0 to 2.0	NA	> 2.0
Initial Seal - Size 10	< 1.2	NA	1.2 to 3.0	NA	> 3.0
Initial Seal - Size 10/5	< 1.0	NA	1.0 to 2.0	NA	> 2.0
Initial Seal - Size 10/7	< 1.0	NA	1.0 to 2.0	NA	> 2.0
Initial Seal – Size 14/7	< 1.2	NA	1.2 to 2.7	NA	> 2.7
Surface Enrichment	< 0.8	NA	≥ 0.8	NA	

Notes:

1. Surface texture measurements for seals and surface enrichment may be undertaken at any time during the Defects Liability Period, but final acceptance of works is not affected until the end of the Defects Liability Period.
2. Surface texture measurements for Initial Seals must be undertaken no sooner than 10 weeks after placement, and no later than 15 weeks after placement. If tests are not undertaken in this period and later test results require the works to be rectified, the later test results are to be used for acceptance of the works.

- 12.8 Surface texture measurements for seals and surface enrichment may be undertaken at any time during the Defects Liability Period, but final acceptance of works is not affected until the end of the Defects Liability Period.
- 12.9 Surface texture measurements for Initial Seals must be undertaken no sooner than 10 weeks after placement, and no later than 20 weeks after placement. If tests are not undertaken in this period and later test results require the works to be rectified, the later test results are to be used for acceptance of the works.
- 12.10 Sections less than 10 m² may be excluded unless the accumulated area of the seal outside of the acceptable range is more than 50 m² per lot.

Aggregate Retention

- 12.11 An initial assessment of the degree of stripping will be made visually. The Principal may direct that nominated areas be tested using AGPT-T254 (or an equivalent test method specified elsewhere in the Contract).
- 12.12 Unless alternative values are specified elsewhere in the Contract, the values specified in Table 12.9 will be used to determine whether the degree of stripping is Conforming, Conditionally Conforming or Non-conforming.

Table 12.9: Degree of Aggregate Stripping

Degree of Stripping	Classification
0 to 2	Conforming
3 to 5	Conditionally Conforming - This Work to be re-tested after 3 months from the initial test. If the Degree of Aggregate Stripping has increased since it was last tested, the work must be rectified.
Greater than 5	Nonconforming

- 12.13 Sections less than 0.5 m² may be excluded unless the accumulated area of the seal outside of the acceptable range is more than 3 m² per lot.
- 12.14 The surface must have a uniform colour and texture to provide a consistent appearance. Aggregate for each job item (including aggregate used for repairs and remedial works) must be supplied from the same source.

13. Testing

- 13.1 At any time prior to the expiry of the Defects Liability Period, the Principal may direct that testing for texture depth or degree of stripping is carried out.
- 13.2 Testing of texture depth or aggregate retention must comply with the following:
- The tests for texture depth must be carried out at locations within the wheel paths.
 - Aggregate retention measurements must be performed outside the wheel paths where aggregate loss is visually considered to be most severe.
 - Lots must be selected to encompass visually uniform sections of seal.
 - The test lot size must not be less than 100 m of single traffic lane or more than 1200 m of single traffic lane.
 - Testing must be performed at the frequency specified in Table 13.1 and test locations must be evenly spaced within the lot.

- f) For any testing undertaken on areas other than within traffic lanes, the lot size must be not less than 400 m² or more than 2500 m² with 3 tests being required per lot.

Table 13.1: Texture and Aggregate Retention Testing Frequency

Lot Size (m)	Testing Frequency per Lot
100 – 600	3
601 – 1200	5

13.3 If directed by the Principal, the Contractor must:

- immediately prior to use, take a one litre representative sample of binder from the tanker/storage tank in accordance with AGPT-T101;
- label the sample at the time of sampling so that it is fully traceable and store it until the expiry of the Defects Liability Period so that it does not become contaminated or deteriorate; and
- undertake testing as directed by the Principal for compliance with the properties specified in Clause 6.

13.4 The Principal must be given 2 days notice of when testing will be undertaken.

WITNESS POINT 1.	
Process	testing of surface texture and aggregate retention
Notification	Notification of the testing must be submitted at least 2 days prior to the commencement of the tests.

14. Records

- Where a proforma Daily Record Sheet and / or Job Completion Report is included in the Contract, the Contractor must complete that proforma (or an approved equivalent) in accordance with this Clause 14.
- Where a Daily Record Sheet is required, it must be certified correct by the Contractor and submitted prior to the start of the next working day. Details of all materials applied must be recorded immediately after each spraying “run”.
- Where a Job Completion Report is required, it must be certified correct by the Contractor and submitted within 7 days of completion of sealing each job.
- If a representative of the Principal is on site during the works, the Contractor must ensure that the representative is given an opportunity to view and sign the Daily Record Sheet and / or Job Completion Report.
- The Contractor must submit all test results to the Principal within 5 working days of the completion of the test.
- The following information must be supplied with the test results:
 - test certificates from a NATA accredited laboratory⁽¹⁾;
 - date and time of testing;
 - test site offset and chainage ⁽²⁾; and
 - individual test results and mean values per Lot.⁽²⁾

Note

- NATA accreditation is not required for texture and aggregate stripping tests.
- Does not apply to binder testing

15. Maintenance and Defects Liability

- 15.1 During the Defects Liability Period, the Contractor must monitor the condition of the sprayed seal, which includes regular and timely inspection of the seal, management of traffic during inspections and detailed monitoring of any section of the spray seal showing signs of premature deterioration.
- 15.2 Prior to the expiry of the Defects Liability Period, the Contractor must ensure that the surface condition of the sprayed seal is free of Defects, which may include undertaking:
- a) any work necessary to protect and maintain the seal, including traffic management; and
 - b) repairs to the seal.
- 15.3 The Contractor is not responsible for Defects which result from:
- a) failure of the subgrade / sub-base / base course (unless the construction of the subgrade / sub-base / base course is included in the Contract); or
 - b) events not reasonably foreseeable at the time of submission at the Contractor's tender (such as oil spills, accidents, fires and mechanical damage from farm / construction equipment).
- 15.4 A seal which exhibits a Defect must be repaired or resealed in accordance with the Contractor's Quality Plan and this Specification.

HOLD POINT 6.

Process Held	Application of remedial treatment.
Submission Details	Details of the proposed remedial treatment must be provided to the Principal at least 7 days prior to the commencement of the work.

- 15.5 Undertaking a repair or reseal must not be unreasonably delayed.
- 15.6 If the condition of the seal is hazardous to road users, the Contractor must take action to preserve the work and make the road safe (including temporary traffic control measures if necessary) within 24 hours of becoming aware of the issue (or any other timeframe specified elsewhere in the Contract).
- 15.7 The Defects Liability Period for the remedial treatment will commence on the date of repair in accordance with the provisions of the Contract.
- 15.8 The Contractor must:
- a) carry out at least two inspections of each job during the Defects Liability Period (in addition to any inspections required where non-compliant work has been identified);
 - b) prepare Condition Reports at the completion of each inspection, which include details of the condition of the seal, any defects and any proposed corrective action; and
 - c) prepare a Completion Report, no earlier than 60 days prior to the expiry of the Defects Liability Period, which include details the condition of the seal, any defects and any proposed corrective action.
- 15.9 Condition reports must be submitted to the Principal within 5 working days of the completion of the inspection.

Annexure A: Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points / Hold Points that apply to this specification and the Records that the Contractor must supply to the Principal to demonstrate compliance with this specification.

Clause	Hold Point	Witness Point	Record
4	1. Commencement of sprayed sealing		Quality Plan
5.2	2. Commencement or continuation of sprayed sealing		Program
7.10	3. Commencement of sprayed sealing		Seal Design
9.6	4. Commencement of sprayed sealing work at intersections and junctions		Proposed Spray Plan
9.20	5. Application of binder		Evidence that the surface is ready for sealing
13.3		1. Testing of surface texture and aggregate retention	
14.1			Daily Record sheet and / or Job Completion Report
14.1			Test Results
15.4	6. Repair of a seal by the application of a further seal coat.		Details of the proposed seal
15.8			Condition Report and Completion Report

Amendment Record

Amendment no.	Clauses amended	Action	Date
-	New specification	New	November 2020
1	14.1 Correction of cross reference to clause.	Substitution	June 2022

Key

Format	Change in format
Substitution	Old clause removed and replaced with new clause
New	Insertion of new clause
Removed	Old clauses removed