

Master Specification

Part RD-BP-D4

Surface Characteristics of Flexible Pavements

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Government of South Australia
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RD-BP-D4 Surface Characteristics of Flexible Pavements

1 General

- a) This Master Specification Part sets out the requirements for the measurement, reporting and acceptance of the surface characteristics of finished flexible pavements including:
 - i) the documentation requirements, as set out in section 2;
 - ii) the requirements for roughness, as set out in section 3;
 - iii) the requirements for lane shaping and rutting, as set out in section 4;
 - iv) the requirements for cracking, as set out in section 5;
 - v) the requirements for skid resistance, as set out in section 6;
 - vi) the requirements for texture, as set out in section 7;
 - vii) the general test methods and measurement procedures, as set out in section 8;
 - viii) the general reporting requirements, as set out in section 9;
 - ix) the test procedures, as set out in section 10; and
 - x) the Hold Point requirements, as set out in section 11.
- b) This Master Specification Part does not apply to texture or aggregate retention requirements of sprayed seal surfacings, which can be found in RD-BP-D2 “Design and Application of Sprayed Bituminous Surfacing” and RD-BP-D3 “Surface Characteristics of Spray Seals”. The roughness, cracking, rutting and skid resistance requirements of this Master Specification Part do apply to sprayed seal surfaced pavements, unless specifically noted.
- c) This Master Specification Part does not apply to the areas stated in section 8.2.
- d) The surface characteristics of finished flexible asphalt pavements must comply with the Reference Documents, including:
 - i) AGAM Technical Information Part 15: Technical Supplements;
 - ii) AGPT Part 5: Pavement Evaluation and Treatment Design;
 - iii) Austroads Test Method AGAM-T009 Pavement Rutting Measurement with a Laser Profilometer;
 - iv) Austroads Test Method AGAM-T004 Pavement Roughness Repeatability and Bias Checks for an Inertial Profilometer;
 - v) Austroads Test Method AGAM-T012 Pavement Rutting Repeatability and Bias Checks for a Laser Profilometer;
 - vi) Austroads Test Method AGAM-T016 Pavement Surface Texture Repeatability and Bias Error Checks for a Laser Profilometer;
 - vii) Austroads Test Method ATM-453 Surface Deviation Using a Straightedge;
 - viii) Department Test Procedure TP348 Determination of Pavement Surface Roughness Using the Laser Profiler (available from: https://dit.sa.gov.au/standards/test_procedures);
 - ix) Department Test Procedure TP344 Determination of Skid Resistance with the GripTester (available from: https://dit.sa.gov.au/standards/test_procedures); and
 - x) Department Test Procedure TP352 Determination of Pavement Surface Texture Using the Laser Profiler (available from: https://dit.sa.gov.au/standards/test_procedures).

- e) Without limiting the obligation to comply with the document to the extent they form Reference Documents in other Master Specification Parts, The Little Book of Profiling, published by the University of Michigan Transportation Research Institute (UMTRI) (available from: <http://www.umtri.umich.edu>), must be considered and applied to the extent required by Law and to meet the Contractor's Best Industry Practice obligations:
- f) The surface characteristics of a finished flexural pavement must comply with this Master Specification Part and AGAM Technical Information Part 15: Technical Supplements.
- g) The Contractor must undertake the testing and retesting of the finished pavement and reporting of the results.

2 Documentation

2.1 Construction Documentation

In addition to the requirements of PC-CN3 "Construction Management", the Construction Documentation must include proof of repeatability testing if required by 8.3a).

2.2 Quality Management Records

In addition to the requirements of PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable), the Quality Management Records must include:

- a) surface roughness testing, as required in section 3.5a);
- b) roughness report, as required in section 3.6c);
- c) shape and rut testing report, as required in section 4.4b);
- d) cracking visual condition survey report, as required in section 5.3a);
- e) wearing course skid resistance test results, as required by section 6.2b);
- f) early life skid resistance test results, as required in section 6.3a);
- g) grip test skid resistance results in accordance with section 6.4;
- h) a report detailing results of texture depth testing in accordance with section 7.4a); and
- i) test reports as required by section 8.3b).

3 Roughness

3.1 General

- a) The Contractor must ensure that the finished surface of the pavement wearing course has a smooth longitudinal profile and the measured roughness must not exceed the values specified in this section 3.
- b) NAASRA roughness values must be calculated from the IRI value in accordance with section 3.1f).
- c) Roughness must be measured with one of the following class 1 profilers over the sections of pavement specified:
 - i) 2 laser profiler; or
 - ii) multi-laser profiler.
- d) Roughness must be measured in accordance with Department Test Procedure TP348 Determination of Pavement Surface Roughness Using the Laser Profiler.

- e) The roughness testing equipment must measure longitudinal profile in both wheel paths over the wavelength range 0.5 m to 50 m. Sampling must be performed at a maximum interval of 250 mm, in each wheel path of each lane or ramp in the proposed direction of travel of traffic.
- f) From the measured profile a wheel path IRI and lane IRI (quarter car) must be determined. The lane IRI must be converted to NAASRA counts using the equation, NAASRA (counts/km) = 26.49 IRI lane - 1.27 (quarter car).
- g) The Contractor must undertake traffic control in accordance with the requirements of PC-SM1 "Traffic and Pedestrian Management". In addition, in order for the profiler to gain accurate data speed, restrictions must be in place to allow the profiler to travel uninterrupted at a speed of not less than 40 km/h.
- h) During the pavement Works, the Contractor must undertake roughness testing on the topmost and second to topmost pavement layer, including asphalt and granular courses, to meet wearing course roughness requirements.
- i) When undertaking actual Site measurements, the Contractor must ensure that the results of each run do not deviate from the mean of the runs for each 100 m section by more than 10%.

3.2 Acceptance limits: new pavements

- a) The Contractor must ensure that, subject to sections 3.4 and 8.2, the mean IRI and NAASRA roughness for each 100 m section of wearing course does not exceed the maximum values specified in Table RD-BP-D4 3-1.
- b) The surface roughness of finished wearing courses of new pavements must comply with Table RD-BP-D4 3-1.

Table RD-BP-D4 3-1 New pavement roughness acceptance limits

Location	Stage	100 m Section average roughness IRI (m/km) [NRM (c/km)] ⁽³⁾	
		Target value	Unacceptable
Motorway / freeway / expressway and ramps - asphalt	Completion	≤1.0 [25]	>1.2 [30]
	2 years after Completion	-	>1.4 [35]
	4 years after Completion ⁽⁴⁾	-	>1.75 [45]
High speed environment for all other road classes (>70 km/h) ⁽²⁾ - asphalt	Completion	≤1.4 [35]	>1.6 [40]
	2 years after Completion	-	>1.75 [45]
High speed environment for all other road classes - sprayed seal surface (>70 km/h) ⁽²⁾	Completion	≤1.6 [40]	>1.75 [45]
	2 years after Completion	-	>1.9 [50]
Low speed environment for all other road classes (≤70 km/h) ⁽²⁾ - all surfaces	Completion	≤1.6 [40]	>1.75 [45]
	2 years after Completion	-	>1.9 [50]
Action / outcome		None (acceptable)	Rectification work ⁽¹⁾

Table notes:

- (1) See section 3.7.
- (2) The "speed limit" referred to above is the speed limit imposed for the finished Works.
- (3) Reported as average values over 100 m sections as per section 3.6a).
- (4) If required in the Contract Documents.

3.3 Acceptance limits: plane and reinstatement pavements

The Contractor must ensure that finished wearing courses of plane and reinstatement pavement Works comply with the requirements in Table RD-BP-D4 3-2.

Table RD-BP-D4 3-2 Plane and reinstatement roughness acceptance limits

Location	Stage	Roughness - 100 m reporting length (IRI m/km [NRM c/km] ⁽³⁾)	
		Target value	Unacceptable
Motorway / freeway / expressway and ramps	Completion	≤1.4 [35]	>1.6 [40]
	2 years after Completion	-	>1.75 [45]
	4 years after Completion ⁽⁴⁾	-	>1.9 [50]
High speed environment for all other road classes (>70 km/h) ⁽²⁾	Completion	≤1.6 [40]	>1.75 [45]
	2 years after Completion	-	>1.9 [50]
Low speed environment for all other road classes (≤70 km/h) ⁽²⁾	Completion	≤1.75 [45]	>1.9 [50]
	2 years after Completion	-	>2.15 [55]
Action / outcome		None (acceptable)	Rectification work ⁽¹⁾

Table notes:

(1) See section 3.7.

(2) The “speed limit” referred to above is the speed limit imposed for the finished Works.

(3) Reported as average values over 100 m sections as per section 3.6a).

(4) If required in the Contract Documents.

3.4 Acceptance limits: thin overlays or inlays - dependence on underlying layers

Where the construction of the underlying layer does not form part of the Works, and the required bituminous layer thickness is ≤50 mm, the higher of the maximum roughness levels indicated in Table RD-BP-D4 3-2 or that derived from the following equations must not be exceeded:

- a) $(\text{NAASRA count before overlay/inlay} \times 0.55) + 5 \text{ c/km}$; or
- b) $(\text{IRI before overlay} \times 0.55) + 0.2 \text{ m/km}$.

3.5 Testing frequency

- a) The surface roughness must be tested by the Contractor and the results provided as part of the Quality Management Records in accordance with the frequency described in Table RD-BP-D4 3-1 and Table RD-BP-D4 3-2.
- b) For Works where the bituminous layer thickness is ≤50 mm, the Contractor must test the existing surface before new work and before any milling of asphalt layers.
- c) The Contractor must undertake testing of all rectification work undertaken pursuant to section 3.7.

3.6 Reporting

- a) For the purposes of surface roughness reporting, each lane must be divided into 100 m sections. Lengths less than 100 m must be included in the previous adjacent 100 m length.
- b) The roughness value of each section must be taken as the average count taken over 3 runs in the proposed direction of travel.
- c) A report in accordance with section 9 detailing results of roughness testing must be submitted by the Contractor as part of the Quality Management Records within these timeframes:
 - i) if required in the Contract Documents, results of testing undertaken prior to the application of the final wearing surface must be submitted a minimum of 48 hours prior to the final wearing surface being applied; and
 - ii) results of testing undertaken on the final wearing course must be submitted within 5 days after measurements are taken.

- d) The report required by section 3.6c) must contain the following information:
 - i) documentation required to be provided pursuant to Department Test Procedure TP348 Determination of Pavement Surface Roughness Using the Laser Profiler;
 - ii) general reporting requirements listed in section 8;
 - iii) left wheel path roughness (IRI);
 - iv) right wheel path roughness (IRI);
 - v) quarter car roughness (IRI) for each run;
 - vi) quarter car roughness (NAASRA counts) for each run; and
 - vii) mean lane roughness together with the percentage deviation from the mean.

3.7 Rectification work

- a) In the event of the surface roughness exceeding the acceptance limit, this will constitute a Non-Conformance in accordance with PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable).
- b) In the event of a Non-Conformance contemplated by section 3.7a):
 - i) any Work Lots with test results above the unacceptable limits must be reworked at the Contractor’s full cost;
 - ii) the proposed remediation must be of sufficient scope to comply with all requirements of this Master Specification Part; and
 - iii) for test results between target and unacceptable, the payment for the supply and placement of the wearing course asphalt due to the Contractor must be reduced by 10% for each 1.0 NRM or part thereof above target must apply.

4 Lane shape or rutting

4.1 General

- a) The Contractor must ensure that the pavement wearing course has a smooth transverse lane shape. Lane shape or rutting must meet acceptance limits as detailed in section 4.2 and must not lead to any water ponding or have visible ruts within a wheel path.
- b) The Contractor must undertake measurement of lane shape at construction and lane rutting after trafficking based on either:
 - i) the maximum rut depth under a 3 m straight edge or 1.2 m straight edge in localised areas (manual measurement); or
 - ii) the maximum rut depth in each wheel path under a simulated 2 m straight edge and the maximum lane rut depth under a simulated 3 m straight edge, using a multi-laser (automated measurement). Manual measurement of lane shape or rutting must be measured in accordance with Austroads Test Method ATM-453 Surface Deviation Using a Straightedge. Measurement must be performed at:
 - A. 20 m spacings along each traffic lane; and
 - B. any localized areas between these points visually identified as having possible lane shape non-conformances with Table RD-BP-D4 3-2.
- c) Automated measurement of lane shape and lane rutting measurement referred to in section 4.1b)i) must be measured by a class 2 or higher profile measuring device in accordance with Austroads Test Method AGAM-T009 Pavement Rutting Measurement with a Laser Profilometer. Sampling must be performed at a maximum interval of 250 mm, in each wheel path of each lane or ramp in the proposed direction of travel of traffic.

- d) The Contractor must ensure that traffic control is undertaken in accordance with the requirements of PC-SM1 "Traffic and Pedestrian Management". In addition, in order for the profiler to gain accurate data speed, restrictions must be in place to allow the profiler to travel uninterrupted at a speed of not less than 40 km/h.

4.2 Acceptance limits

- a) The acceptance limits for finished wearing courses are listed in Table RD-BP-D4 4-1.
- b) Should rutting occur in excess of the acceptance limits listed in Table RD-BP-D4 4-1 at any stage prior to the end of the Defects Liability Period the Contractor must issue a Non-Conformance Notice.

Table RD-BP-D4 4-1 Lane shape or rutting acceptance limits

Stage	Maximum rut depth (mm) in each wheel path
Completion	≤3
2 years after Completion	≤5

4.3 Testing frequency

The minimum frequency for lane rutting testing and reporting must be completed as described in Table RD-BP-D4 4-1.

4.4 Reporting

- a) For the purposes of lane shape or rutting reporting, each lane must be divided into 100 m sections. Lengths less than 100 m must be included in the previous adjacent 100 m length.
- b) The Contractor must submit a report in accordance with section 9 detailing results of lane shape and lane rut testing as part of the Quality Management Records.
- c) The testing report required by section 4.4b) must contain the following information:
- i) documentation required to be provided pursuant to AGAM-T009 Pavement Rutting Measurement with a Laser Profilometer;
 - ii) the general reporting requirements in section 8;
 - iii) left wheel path rut depth plotted against section distance;
 - iv) right wheel path rut depth plotted against section distance; and
 - v) mean lot rut depth for each wheel path and each lane together with the standard deviation.

4.5 Rectification work

- a) In the event of the lane shape or lane rutting exceeding the acceptance limit, this will constitute a Non-Conformance in accordance with PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable).
- b) In the event of a Non-Conformance pursuant to section 4.5a):
- i) any Work Lots with test results in excess of the acceptance limits or where any water ponding occurs, must be reworked at the Contractor's full cost; and
 - ii) the proposed remediation must be of sufficient scope to comply with all requirements of this Master Specification Part.

5 Cracking

5.1 General

- a) Cracking extent must be determined via visual inspection and presented on a scaled graphical pavement condition survey, utilising the distress categories presented in the AGPT Part 5: Pavement Evaluation and Treatment Design.
- b) The Contractor must assess the extent of cracking and provide a report at Completion, and 2 years after Completion.
- c) The Contractor must ensure that traffic control is undertaken in accordance with the requirements of PC-SM1 "Traffic and Pedestrian Management" during inspection if necessary.

5.2 Maximum cracking levels

Cracking must be assessed through a joint site inspection between the Principal and Contractor. There must be no cracking in the pavement at Completion or within 2 years of Completion.

5.3 Reporting

- a) A visual condition survey report in accordance with section 9 including detailed results of cracking must be included as part of the Quality Management Records prior to Handover and Completion.
- b) The report required by section 5.3a) must contain the following information in addition to general reporting requirements in section 8:
 - i) visual condition survey report;
 - ii) description of cracking locations including lane number, chainage or road running distance;
 - iii) cracking type and extent including crack width; and
 - iv) photographic evidence.

5.4 Rectification work

- a) In the event the cracking exceeds the acceptance limit, this will constitute a Non-Conformance in accordance with PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable).
- b) As part of the Non-Conformance:
 - i) any Work Lots with cracking must be reworked at the Contractor's cost; and
 - ii) the proposed remediation must be of sufficient scope to comply with all requirements of this Master Specification Part.

6 Skid resistance

6.1 General

- a) The Contractor must ensure that the finished surface of the OGA and SMA pavement wearing course has adequate skid resistance to safeguard road user's safety and meet skid resistance requirements detailed in section 6 as a minimum.
- b) The skid resistance of OGA and SMA wearing surfaces must be measured by the Contractor in both the inner and outer wheel paths in accordance with Department Test Procedure TP344 Determination of Skid Resistance with the GripTester, and reported at 100 m intervals.

- c) The testing interval is to be set at 10 m or 1 m dependent on Griptester configuration and in accordance with Department Test Procedure TP344 Determination of Skid Resistance with the GripTester.
- d) The Contractor must ensure that traffic control is undertaken in accordance with the requirements of PC-SM1 "Traffic and Pedestrian Management" during testing if required.

6.2 Acceptance limits

- a) The Contractor must ensure that skid resistance levels on the finished wearing courses exceed the skid resistance acceptance levels as per Table RD-BP-D4 6-1.
- b) The Contractor must ensure that during wearing course's early life, skid resistance meets the following levels and all test records must be included in the Quality Management Records:
 - i) for speed environments ≤ 60 km/h, a lowered safe travelling speed and appropriate signage to be applied on opening to traffic and maintained until bitumen has been worn from wearing course aggregate demonstrated by achievement of 0.35 Grip, whereupon an increase in operating speed and signage can be applied. Full operational speed can be applied once 0.45 Grip units has been achieved; or
 - ii) for speed environments > 60 km/h:
 - A. a lowered limit (60 km/h) must be posted until a maximum of 3 weeks following opening of road to traffic;
 - B. 'New surface' wording and a slippery surface symbol must be in place with the lower speed limit sign for the 3-week period;
 - C. at the end of the 3-week period, the lower speed limit signs are to be removed; and
 - D. the slippery surface symbol and the 'new surface' signage must remain in place until 0.45 Grip units has been achieved.
- c) The Contractor must consult the Principal prior to removal of speed limit signs under this section 6.2.

Table RD-BP-D4 6-1 Wearing course skid resistance acceptance limits

Road situation	Minimum grip no. (Grip units)	Maximum vehicle speed km/h
Difficult sites - steep grades ($>5\%$), intersection approaches, tight bends, roundabouts.	0.50	60
Urban arterial and urban connector roads	0.55	80
Motorway, rural arterial and rural connector roads	0.45	60
Access roads	0.45	110
Early life - refer to section 6.3	0.40	60
	0.35 ⁽¹⁾	

Table notes:

(1) Not applicable for speed environments > 60 km/h.

6.3 Testing frequency

- a) The skid resistance must be tested by the Contractor and test results included in the Quality Management Records as per Table RD-BP-D4 6-2 for all mixes other than dense graded mixes.
- b) Early life skid resistance must achieve the limits stated in section 6.2 adopting the following minimum frequencies, processes, and stages with all test results included in the Quality Management Records for OGA and SMA:
 - i) for section 6.2b)i), every 5 days following opening to traffic; or

- ii) for section 6.2b)ii), every 10 days after lifting speed for section 6.2b)i).

Table RD-BP-D4 6-2 Wearing course skid resistance testing frequency

Location	Testing frequency for wearing course			
	Completion	Early life testing ⁽¹⁾	2 years after Completion	4 years after Completion ⁽²⁾
Motorway / freeway / expressway and ramps	✓	✓	✓	✓
High speed environment for all other road classes (>70 km/h)	✓	✓		
Low speed environment for all other road classes (≤70 km/h)	✓			

Table notes:

(1) SMA and OGA wearing course can exhibit low skid resistance in early life until the binder has worn off the aggregate surface.

(2) If required in the Contract Documents.

6.4 Reporting

- a) The Contractor must prepare and submit a report in accordance with section 9 detailing results of grip testing as part of the Quality Management Records.
- b) The report required by section 6.4a) must contain:
 - i) the documentation required by Department Test Procedure TP344 Determination of Skid Resistance with the GripTester;
 - ii) general reporting requirements in section 8;
 - iii) left wheel path grip number plotted against section distance; and
 - iv) long term mix specific skid management report.
- c) For the purposes of skid resistance reporting, each lane must be divided into 100 m sections. Lengths less than 100 m must be included in the previous adjacent 100 m length.

6.5 Rectification work

Where skid resistance results are below acceptance limits, this will constitute a Non-Conformance in accordance with PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable). The Contractor must identify the cause and carry out suitable treatments at the Contractor’s full cost and be of sufficient scope to comply with all requirements of this Master Specification Part. All treatments require Principal approval.

7 Texture

7.1 General

- a) The Contractor must ensure that the finished surface of an asphalt wearing course has a uniform texture in accordance with the acceptance limits detailed in this section 7.
- b) The Contractor must measure the texture depth by a class 1 texture measuring device, in accordance with Department Test Procedure TP352 Determination of Pavement Surface Texture Using the Laser Profiler.
- c) The Contractor must measure the texture depth in both the inner and outer wheel paths of all lanes and ramps and converted to equivalent sand patch texture depth. Sampling must be performed at a maximum interval of 250 mm.

- d) The Contractor must ensure that traffic control be undertaken in accordance with the requirements of PC-SM1 “Traffic and Pedestrian Management” as required for testing. In addition, in order for the profiler to gain accurate data speed, restrictions must be in place to allow the profiler to travel uninterrupted at a speed of not less than 40 km/h and not greater than 95 km/h.

7.2 Acceptance limits

- a) Wearing course surface texture acceptance limits are stated in Table RD-BP-D4 7-1 and are related to the mix type.
- b) Surface texture target values are preferred surface texture mean values for each run.
- c) Results must be normally distributed around the target values.
- d) The Contractor must ensure acceptance limits are not exceeded.

Table RD-BP-D4 7-1 Wearing course surface texture acceptance limits

Wearing course	Stage ⁽³⁾	Texture depth SPT (mm)		
		Target value	Unacceptable - low	Unacceptable - high
Open graded asphalt, OG14	Completion ⁽¹⁾	≥1.2	<1.0	>1.5
	2 years after Completion	-	<0.9	-
	4 years after Completion	-	<0.9	-
Stone mastic asphalt, SMA10	Completion ⁽¹⁾	≤1.1	<0.7	>1.2
	2 years after Completion	-	<0.6	-
	4 years after Completion	-	<0.6	-
Dense mix asphalt, AC10	Completion ⁽¹⁾	≤0.4	<0.3	>0.5
	2 years after Completion	-	<0.3	-
	4 years after Completion	-	<0.25	-
Fine dense mix asphalt, Ac10	Completion ⁽¹⁾	≤0.3	<0.1	>0.4
	2 years after Completion	-	-	-
	4 years after Completion	-	-	-
Action / outcome		None (acceptable)	Rework ⁽²⁾	Rework ⁽²⁾

Table notes:

- (1) Texture depth for OGA/SMA is more accurate after pavement has been given time to age due to binder reflectivity.
- (2) See section 7.5.
- (3) Minimum of 2 tests.
- (4) If required in the Contract Documents.

7.3 Testing frequency

The texture depth must be tested and reported within 2 months of Completion and 2 years after Completion.

7.4 Reporting

- a) A report in accordance with section 9 detailing results of texture depth testing must be included as part of the Quality Management Records.
- b) The report required by section 7.4a) must contain the following information:
- i) documentation required to be provided pursuant to Department Test Procedure TP352 Determination of Pavement Surface Texture Using the Laser Profiler;
 - ii) general reporting requirements in section 8;
 - iii) inner wheel texture depth plotted against section distance;
 - iv) outer wheel texture depth plotted against section distance; and

- v) mean inner and outer wheel path texture depth per lot together with the standard deviation.
- c) For the purposes of texture reporting, each lane must be divided into 100 m sections. Lengths less than 100 m must be included in the previous adjacent 100 m length.

7.5 Rectification work

- a) In the event that the texture does not meet the acceptance limits, this will constitute a Non-Conformance in accordance with PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable).
- b) In the event of a Non-Conformance contemplated by section 7.5a):
 - i) any Work Lots with test results not meeting the acceptance limits must be reworked at the Contractor’s full cost; and
 - ii) the proposed remediation must be of sufficient scope to comply with all requirements of this Master Specification Part.

8 General test methods and measurement procedure

8.1 General measurement requirements

- a) For the purposes of this section 8, wheel paths are deemed to be 750 mm from the centre of each lane (width of dedicated parking lanes to be excluded from lane width).
- b) The location of the start and finish chainages where testing is to be undertaken must be clearly marked out by the Contractor.
- c) For measurements where no pavement marking is present, including granular base, the lane lines and proposed medians at 30 m intervals must be clearly marked out by the Contractor.
- d) Prior to testing for the appropriate surface characteristic, the Contractor must ensure that:
 - i) the pavement is free of loose material and debris when testing is undertaken;
 - ii) for unbound granular bases, measurements must be undertaken prior to sweeping of the pavement; and
 - iii) free water is not present on the pavement when testing is undertaken.
- e) Measurements, daily checks, and calibration of measuring devices must be undertaken in accordance with the manufacturer's instructions and, where applicable, the Reference Documents listed in Table RD-BP-D4 8-1.

Table RD-BP-D4 8-1 Table of test procedures

Surface characteristic	Test procedure / method	Repeatability test procedure / method
Roughness	Department Test Procedure TP348 Determination of Pavement Surface Roughness Using the Laser Profiler	Austrroads Test Method AGAM-T004 Pavement Roughness Repeatability and Bias Checks for an Inertial Profilometer
Lane shape/rutting	Austrroads Test Method AGAM-T009 Pavement Rutting Measurement with a Laser Profilometer	Austrroads Test Method AGAM-T012 Pavement Rutting Repeatability and Bias Checks for a Laser Profilometer
Skid resistance	Department Test Procedure TP344 Determination of Skid Resistance with the GripTester	-
Texture	Department Test Procedure TP352 Determination of Pavement Surface Texture Using the Laser Profiler	Austrroads Test Method AGAM-T016 Pavement Surface Texture Repeatability and Bias Error Checks for a Laser Profilometer

8.2 Exclusions

Those areas that are to be excluded from the requirements of this Master Specification Part are:

- a) within 15m of a roundabout;
- b) railway lines and bridge joints (35 m after the event);
- c) intersections (stop bar to stop bar);
- d) inspection pit covers and surface Defects related to inspection pit covers within the wheel paths (15 m including the event); and
- e) side streets specified in the Contract Documents deemed to affect pavement ride quality (the width of the side street plus 30 m after the event).

8.3 Repeatability requirements

- a) Prior to measurements of each test in Table RD-BP-D4 8-1 commencing, a series of 5 runs for each operator over the section of pavement must be undertaken, unless proof of such repeatability testing, carried out in the 6 months prior to the testing, has been provided in the Construction Documentation. All 5 runs must be completed on the same day over the same section of pavement.
- b) The results of each of the 5 runs must meet the repeatability requirements of repeatability test procedures and methods listed in Table RD-BP-D4 10-1. Only those operators that have satisfied these repeatability requirements must be permitted to undertake surface characteristic testing. The test data to be submitted as part of the Quality Management Records prior to any further data collection taking place.
- c) Skid resistance testing using contractor GripTester must be calibrated against the Principal's GripTester by testing together on same day and conditions, on predetermined sites. Contractor data must use an appropriate factor to not differ from the Principal's data. Calibration is to be carried out on a minimum 12-monthly basis.
- d) Any anomalies between the results of the calibration required in section 8.3c) resulting in the repeatability requirements not being met will constitute a **Hold Point**. Further testing must not occur until this Hold Point has been released.
- e) If any electronic or mechanical failure occurs on the test vehicle that are likely to affect the repeatability or accuracy of data collected, evidence must be provided that demonstrates that results before and after the incident match.

9 General reporting requirements

In addition to the specific reporting requirements for the testing of each surface characteristics in this Master Specification Part, the following general reporting requirements apply:

- a) raw test data must be included along with any prepared report and included in the Quality Management Records;
- b) full details of exclusions in section 8.2 to be provided in the report;
- c) the report must contain the following information in addition to documentation to be provided pursuant to the Reference Documents including:
 - i) road number;
 - ii) surfacing type;
 - iii) including details of asphalt mix, binder, aggregate size and source;
 - iv) survey date (yymmdd);

- v) daily calibration check results in alignment with relevant test procedures/methods;
 - vi) Work Lot number and length (m);
 - vii) start and finish chainage referenced to the road running distance or chainage; and
 - viii) direction of travel and lane number;
- d) lane identification must comply with the following convention:
- i) the lane where the direction of travel coincides with increasing road running distance is deemed to be the left lane; and
 - ii) lane numbers (i.e. L1, L2) must increase with distance from the median or centre line; and
- e) all results must be presented with other Work Lot documentation for the wearing course in a predetermined grid format and in an approved electronic format in the Quality Management Records.

10 Table of test procedures

The Contractor must use the test procedures specified in Table RD-BP-D4 10-1 to verify conformance with this Master Specification Part.

Table RD-BP-D4 10-1 Test procedures

Test	Test procedure
Determination of pavement surface roughness using the laser profiler	TP348
Determination of skid resistance with the GripTester	TP344
Determination of pavement surface texture using the laser profiler	TP352
Pavement rutting measurement with a laser profiler	AGAM-T009 ATM-453-22

11 Hold Points

Table RD-BP-D4 11-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.

Table RD-BP-D4 11-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
8.3d)	Anomalies in test data	Construction quality	24 hours notification