**PART R27**

**SUPPLY OF ASPHALT**

**CONTENTS**

1. General

2. Quality Requirements

3. Materials

4. Mix Requirements

5. Manufacture of Mixes

6. Production Sampling and Testing

7. Property Variations of Production Asphalt

8. Storage of Asphalt

9. Delivery of Mix

10. Test Procedures

11. Hold Points

12. Verification Requirements and Records

Attachment R27A: Asphalt Inspection Test and Verification

Attachment R27B: Assessment and Registration of Asphalt Mix Designs

1. **General**

This Part specifies the requirements for the supply of Hot Mix Asphalt (HMA), with and without an Additive, and Warm Mix Asphalt (WMA) including the design and manufacture of the following:

1. Coarse Dense Mix Asphalt (AC10, AC14 & AC20);
2. Fine Dense Mix Asphalt (FineAC7, FineAC10 & FineAC14);
3. Open Graded Asphalt (OG10 & OG14); and
4. Stone Mastic Asphalt (SMA7 & SMA10).

In the event of any inconsistency, ambiguity or discrepancy between any of the Contract Documents, the order of precedence must be as follows:

1. This Part
2. Austroads Guide to Pavement Technology Part 4B “Asphalt”
3. AS2150 “Hot Mix Asphalt - A Guide to Good Practice”
4. Industry documentation

The meaning of terms used must be as follows:

**"AAPA"** means Australian Asphalt Pavement Association.

**“Additive”** means an organic, chemical, or emulsion product used to assist in the compaction of asphalt.

**“AS 2150”** Australian Standard: Hot Mix Asphalt-A Guide to Good Practice

**“Austroads 4B”** Guide to Pavement Technology Part 4B Asphalt.

**"Asphalt Mix Design Assessment"** is a documented assessment of a submitted asphalt mix design with an Asphalt Mix Register Number provided by DPTI.

**"Asphalt Mix Register Number"** is a mix approval number provided by DPTI to an accepted nominated mix. All mixes are placed on DPTI’s Asphalt Mix Register and monitored by DPTI.

**"Coarse Asphalt Mix" (AC)** means asphalt of a coarse nature suitable for Medium, Heavy and Very Heavy Duty applications unless used in Fine Asphalt Mix applications or expressly noted otherwise.

**"Fine Asphalt Mix" (FineAC)** means asphalt of a fine nature suitable for Light to Medium Duty applications and suitable for DPTI patch maintenance, bikeways, footpaths, car parks and Local Government residential streets.

**“Hot Mix Asphalt” (HMA)** means an Asphalt Mix manufactured and compacted at standard temperatures. It may also mean Hot Mix Asphalt manufactured at standard temperatures but with the addition of an “Additive” to assist in meeting compaction requirements.

**"Nominated Mix"** means an asphalt mix design proposed by the Contractor.

**“Nominated Combined Aggregate Grading”** means the Contractor’s target design gradings for the Nominated Mix.

**"Nominated Binder Content"** means the Contractor’s target design binder content for the Nominated Mix.

**"Process Control"** means a controlled documented system of practices and procedures used to monitor and control the product inputs, equipment and manufacturing processes to ensure the product replicates the product design.

“**Production Mix**” means manufactured product at an asphalt plant.

**"RAP"** means Reclaimed Asphalt Pavement.

**"SDS"** means Safety Data Sheets.

**“Special Process”** means the Contractor’s documented and demonstrated techniques to achieve the requirements of this Part.

**“Warm Mix Asphalt” (WMA)** means Hot Mix Asphalt manufactured and compacted at lower temperatures with the addition of an “Additive” or by using the foaming technique.

1. **QUALITY REQUIREMENTS**
   1. **Process Control**

The Contractor must develop and implement a Process Control System. The following requirements must be submitted to DPTI for the asphalt plant to obtain approved process control:

1. Monthly RAP & Asphalt Production test results in electronic spreadsheet format;
2. Audit Samples;
3. Monthly process control charts and invitation to process control meeting; and
4. Monthly asphalt plant computing data outputs to match with samples being taken.
   1. **Quality Plan, Procedures and Documentation**

Further to the requirements of Part G20 "Quality System Requirements", the Contractor must prepare and implement a Quality Plan that at a minimum, includes detailed procedures and documentation for:

1. Mix Design
2. Manufacture of Mixes
3. The asphalt production plant, including company brand, mixing type, capacity, year of manufacturing, functionalities, special abilities, silos, computer control system and production history.
4. The laboratory NATA Accreditation certificate, approved tests, and calibration schedule.
5. Process control requirements, which include a description of the flow of materials and the processes carried out on them from input materials to the plant through to delivery of asphalt to the customer. It must incorporate a flow diagramand identification of the key elements of the manufacturing process requiring monitoring, measurement or verification.
6. Control of aggregates transferred from quarry stockpiles and delivered to an asphalt plant.
7. Control of Reclaimed Asphalt Pavement (RAP) transferred from stockpiles and delivered to an asphalt plant.
8. Requirements for labelling of storage bays and silos and bituminous tanks.
9. Requirements for heating, temperature control and insulation of tanks.
10. Requirements for controlling delivery of binders into the correct tanks.
11. Control requirements for binders, foam, additives, admixtures, fillers and reclaimed asphalt.
12. Plant calibration and maintenance.
13. Description of the characteristics of any hot storage system and define its mode of operation.
14. Handling, storage and delivery of asphalt mixture to ensure the minimum of segregation, degradation or binder drain down and that the asphalt remains within the specified temperature range.
15. Inspection and Test Requirements
16. An Inspection and Test Plan, vide Clause G20.7 "Inspection and Testing", which includes a schedule for monitoring and measuring the performance of the process (as identified in the key process element identification) and products. At a minimum, it must meet the requirements of Clauses R27.6 and R27.7 and Attachment R27A.
17. Constant monitoring and statistical analysis of records to verify process capability and product characteristics.
18. A Calibration Schedule, which includes daily visual inspection of all equipment and calibration of weighting equipment, admixture dispensers, flow meters, batching or proportioning systems and temperature monitoring equipment (vide Clause G20.7.4 "Inspection, Measuring and Test Equipment"). At a minimum, it must meet the requirements of Attachment R27A.

If not provided previously the procedures and documentation must be submitted at least 10 days prior to the commencement of supply.

Provision of the procedures and documentation listed in this Clause shall constitute a **hold point**.

The Contractor must use test procedures in accordance with Table 10 “Test Procedures” (refer <http://www.dpti.sa.gov.au/materials_technology_documents/test_procedures2>) to verify conformance with this Part.

1. **MATERIALS**
   1. **Quality of Materials**

Materials must comply with the following:

|  |  |
| --- | --- |
| Binder, Flux and Cutter | Part R25 "Supply of Bituminous Materials" |
| Aggregate, Sand and Mineral Filler | Part R15 "Supply of Pavement Materials” |
| Tack Coat | AS 1160 "Bitumen Emulsions for Construction and Maintenance of Pavements" |
|  | AS 2157 "Cutback Bitumen" |
| Hydrated Lime Filler | AS 1672.1 "Limes for Building". |
| Rejuvenating Agent | Rejuvenating agent must comply with recognised standards for such materials. Diesel is not considered a suitable rejuvenating agent. Rejuvenation agent must be fully disclosed for mix assessment including submission of Safety Data Sheets. |

* 1. **Reclaimed Asphalt Pavement Material**

Reclaimed asphalt pavement material (RAP) must be obtained from milling or excavation of existing asphalt pavements or asphalt plant waste.

For the use of RAP within asphalt mixes the Contractor’s Quality Plan must include a Reclaimed Asphalt Pavement Management Plan and Industry Code of Practice meeting the following minimum requirements:

1. RAP must be crushed and screened as necessary to ensure a maximum size no greater than the maximum size of asphalt being produced and to achieve a reasonably well graded, free flowing, and consistent product.
2. The processed RAP of each size must be placed in separate stockpiles not exceeding 1000 tonne and represent a Lot. Each Lot must be tested for binder content, gradings, viscosity and moisture content at a minimum of one per lot. Test results must be traceable to the asphalt mix containing the RAP.
3. RAP that has been stockpiled for some time and has bound together in some way must be reprocessed, to ensure that it is in a free flowing state at the time of use.

A minimum of one kilogram sample per lot must be provided to the DPTI for auditing.

1. **Mix Requirements**

Mix requirements must comply with the requirements of the latest edition of AUSTROADS 4B, except as varied below.

* 1. **Nominated Mixes**
     1. **General**

All submissions of nominated mixes must be in accordance with Attachment R27B “Assessment and Registration of Asphalt Mix Designs”.

The Contractor must submit to DPTI details of each asphalt mix proposed, together with a Certificate from a laboratory with appropriate NATA registration, stating that each asphalt mix and its constituents meet the requirements of this Part at least:

1. 10 working days for new mix designs; or
2. 5 working days for revised mixes before commencing production of asphalt.

Submission of the details of nominated mixes and Certificate(s) shall constitute a **hold point**.

* + 1. **Compliance**

If the Contractor has previously submitted the nominated mix to DPTI, and has a current Asphalt Mix Register Number and the mix has not been varied in accordance with Clause 4.1.3 "Variations to Nominated Mixes", the following must be submitted:

1. Description of the Job Mix Formula (JMF); and
2. A copy of the latest Asphalt Mix Design Assessment.

Submission of the above information shall constitute a **hold point**.

The Contractor must monitor the production results of all its registered mixes, and must submit a summary of previous mix production data for the submitted mix and to include:

1. Plot of voids verses binder content, max density verses binder content;
2. Summary sheet of JMF data in an electronic spreadsheet format;
3. Process control plots of binder content, max density, production voids & in-situ voids; and
4. Summary of associated non-conformances and dispositions.

Where the analysis of the production test data shows that the Design Air Voids Target requires a different binder content to the nominated binder content, an alternative mix design must be submitted.

* + 1. **Variations to Nominated Mixes**

The Contractor must submit a new nominated mix in compliance with Clause 4.1.1 “General" if:

1. The Contractor proposes to vary the proportions of the constituents in a nominated mix; or
2. The Contractor proposes to change the source of supply of any constituent; or
3. The Asphalt Mix Register Number is withdrawn by DPTI.
   * 1. **Mobile Plants**

The Contractor must submit the asphalt mix history (including mix production data) and details of the nominated mobile plant in accordance Clause 2 “Quality Requirements”.

Plant settings and mix design parameters must be met before proceeding with the permanent works and shall constitute a **hold point**.

A proposal to use plant fuel other than liquefied petroleum gas (LPG), liquefied natural gas (LNG), petrol or diesel shall constitute a **HOLD POINT**.

* 1. **Wearing Course**

Asphalt Binder and Mix types for wearing course must comply with the following:

1. Coarse Dense Mixes must be modified binders using A15E, A35P, A30P or A5EP.
2. Open Graded Mix (OG) must be modified binders using A15E.
3. Stone Mastic Asphalt (SMA) must be modified binders using A15E or A5EP.
4. Fine Dense Mixes must be Class C170 binder for light duty. Class C320 may also be used for light duty pavements subject to approval.

All wearing course layers must contain at least 1% added hydrated lime. A levelling course that is trafficked more than 30 days is deemed to be a wearing course.

Design of asphalt mixes must also meet the requirements of Part R35 “Surface Characteristics”.

* 1. **Coarse Dense Mix Asphalt**

Mix properties for the design and production control of coarse dense mix asphalt excluding RAP must meet the requirements of Table 4.3(a) "Mix Properties of Coarse Dense Mix Asphalt". The grading envelopes must meet the requirements of Table 4.3(b) "Mix Grading Envelopes" and production tolerances on grading and binder content must comply with Table 11 in AS 2150.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TABLE 4.3(a) - MIX PROPERTIES OF COARSE DENSE MIX ASPHALT** | | | | | | | |
| **CHARACTERISTIC** | | **GYRATORY**  **CYCLE No.** | | **AC10** | **AC14** | **AC20** | **AC14HB** |
| Nominal Mix Sieve Size (mm) | | |  | 9.5 | 13.2 | 19 | 13.2 |
| Design & Production Air Voids Target (%) | Medium Duty (MD) | | 80 | 4.0 | 4.0 | 4.0 | 2.5 |
| Heavy Duty (HD) | | 120 | 4.0 | 4.0 | - | - |
| Very Heavy Duty (VHD) | | | Same as Medium Duty using Polymer Modified Binder A5EP (or Refer to DPTI Asphalt Engineer) | | | |
| Production Air Voids Tolerance (%) | | | | Target ± 1.5 | Target ± 1.5 | Target ± 1.5 | Target ± 1.5 |
| Binder Film Index (BFI) (µm) - Minimum | Medium Duty | | 80 | 8.5 | 8.5 | 8.5 | 10.0 |
| Heavy Duty | | 120 | 8.0 | 8.0 | - | - |
| Indirect Tensile Strength (ITS) (kPa) | | | | Report Only | Report Only | Report Only | Report Only |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 4.3(b) - COARSE DENSE MIX GRADING ENVELOPES(1)** | | | | | | |
| **SIEVE** | **AC10** | | **AC14 and AC14HB** | | **AC20** | |
| 26.5 |  |  |  |  | 100 | 100 |
| 19 |  |  | 100 | 100 | 92 | 80 |
| 13.2 | 100 | 100 | 92 | 80 | 82 | 66 |
| 9.5 | 92 | 80 | 83 | 67 | 70 | 53 |
| 6.7 | 82 | 66 | 70 | 54 | 60 | 43 |
| 4.75 | 70 | 52 | 60 | 43 | 51 | 34 |
| 2.36 | 48 | 34 | 42 | 28 | 36 | 23 |
| 1.18 | 34 | 21 | 30 | 19 | 27 | 14 |
| 0.6 | 24 | 14 | 21 | 12 | 19 | 10 |
| 0.3 | 17 | 8 | 16 | 7 | 14 | 6 |
| 0.15 | 11 | 5 | 10 | 6 | 9 | 5 |
| 0.075 | 7 | 4 | 6 | 3 | 6 | 3 |

(1) Aggregate gradings with percentage passing sieve size (mm), in accordance with AS 1152.

* 1. **Fine Dense Mix Asphalt**

Mix properties for design and production control of fine dense mix asphalt excluding RAP must meet the requirements of Table 4.4(a) "Mix Properties of Fine Dense Mix Asphalt"". The grading envelopes must meet the requirements of Table 4.4(b) "Mix Grading Envelopes of Fine Dense Mix Asphalt" and production tolerances on grading and binder content must comply with Table 11 in AS 2150.

|  |  |  |
| --- | --- | --- |
| **TABLE 4.4(a) - MIX PROPERTIES OF FINE DENSE MIX ASPHALT** | | |
| **CHARACTERISTIC** | **FineAC7** | **FineAC10** |
| Light Duty Design (Gyratory Cycles) | 50 cycles | 50 cycles |
| Nominal Mix Sieve Size (mm) | 6.7 | 9.5 |
| Minimum Binder Content (%) | 6.0 | 5.7 |
| Design & Production Air Voids Target (%) | 4.0 | 4.0 |
| Production Air Voids Tolerance (%) | Target ± 1.5 | Target ± 1.5 |
| Target In-situ Voids (%) (refer to Spec R28) | 2.0 – 5.0 | 2.5 – 6.0 |
| Binder Film Index (µm) Minimum | 8.0 | 8.0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TABLE 4.4(b) - MIX GRADING ENVELOPES OF FINE DENSE MIX ASPHALT(1)** | | | | |
| **SIEVE (mm)** | **FineAC7** | | **FineAC10** | |
| **13.2** |  |  |  | 100 |
| **9.5** |  | 100 | 100 | 90 |
| **6.7** | 100 | 90 | 90 | 75 |
| **4.75** | 90 | 75 | 77 | 63 |
| **2.36** | 65 | 51 | 56 | 43 |
| **1.18** | 47 | 35 | 41 | 30 |
| **0.6** | 33 | 23 | 29 | 20 |
| **0.3** | 22 | 15 | 20 | 13 |
| **0.15** | 14 | 9 | 13 | 8 |
| **0.075** | 8 | 5 | 8 | 5 |

(1) Aggregate gradings with percentage passing sieve size (mm), in accordance with AS 1152.

* 1. **Coarse / Fine Dense Mix Asphalt Including RAP**

In addition to the requirements of this clause, Dense Mix Asphalt incorporating Reclaimed Asphalt Pavement must meet the design requirements of Clause 4.3 "Coarse Dense Mix Asphalt" or Clause 4.4 "Fine Dense Mix Asphalt" and the following:

1. For wearing course mixes, the proportion of RAP in the total mix must not exceed 10% for “Coarse Dense Mix Asphalt” and 20% for “Fine Dense Mix Asphalt”;
2. For asphalt mixes with 10% RAP or less added, no added binder or rejuvenation is required;
3. For levelling, intermediate and base course mixes, the proportion of RAP in the total mix must not exceed 50%; excepted for asphalt mixes using polymer modified binders (PMB) must not exceed 20%;
4. For asphalt mixes with 10% or greater (5% increments) RAP content in the total mix, the actual percentage added must be approved by DPTI; and
5. For asphalt mixes with higher than 10% RAP incorporation must use the following additional design components of binder rejuvenation:
6. Extract RAP Binder to determine binder content and viscosity.
7. The viscosity of the binder of the combined mix containing RAP (added binder plus RAP binder) using AGPT/T191 and TP 664 determined before plant mixing shall be equivalent to C320 (260 – 380 Pa.s) with the use of rejuvenating agent using log viscosity formula (AGPT/T193) at a rate of one test per RAP stockpile lot, or
8. The viscosity of the binder of the combined mix containing RAP (added binder plus RAP binder) determined after plant mixing shall be equivalent to C320 (260 – 380 Pa.s) using AGPT/T191 and AGPT/T192 or TP 664 at a rate of one test per RAP stockpile lot.
9. Regular Indirect Tensile Strength (ITS) testing (on a daily production basis) to confirm strength equivalence to mix without addition of RAP as noted on Asphalt Mix Design Assessment.
10. Rejuvenating Agent must be a softer grade bitumen and low volatility oil (if required) capable of combining with bitumen to counteract hardening and produce a lower viscosity grade of binder.
    1. **Open Graded Asphalt**

Mix properties for the design and production control of Open Graded Asphalt (OG) must meet the requirements of Table 4.6(a) "Mix Properties of Open Graded Asphalt". The grading envelopes must meet the requirements of Table 4.6(b) "Mix Grading Envelopes" and production tolerances on grading and binder content must comply with Table 11 in AS 2150.

The design of OG must be to Medium Duty category (80 gyratory cycles) based on the Asphalt Particle Loss Test at 20% to provide a minimum binder content, air voids at 20% providing maximum binder content (80 cycles gyratory compaction), and the mean must be adjusted up by the Asphalt Binder Drain-off Test to give the nominated design binder content. The Contractor may add cellulose fibres to reduce binder drain down.

The design of OG shall use the standard bitumen e.g. C170 or C320. The design is then replicated with PMB’s in accordance with Clause 4.2 “Wearing Course” for both production and performance testing.

|  |  |  |
| --- | --- | --- |
| **TABLE 4.6(a) - MIX PROPERTIES OF OPEN GRADED ASPHALT** | | |
| **CHARACTERISTIC** | **OG10** | **OG14** |
| Nominal Mix Sieve Size (mm) | 9.5 | 13.2 |
| Hydrated Lime (%) - Minimum | 1.0 | 1.0 |
| Design Air Voids Target (%) | 20 | 20 |
| Abrasion (Particle) Loss (%) - Maximum | 20 | 20 |
| Production Air Voids Tolerance (%) | 18 – 23 | 18 – 23 |
| Binder Draindown (%) Maximum | 0.3 | 0.3 |

| **TABLE 4.6(b) - MIX GRADING ENVELOPES (1) (2)** | | | | |
| --- | --- | --- | --- | --- |
| **SIEVE (mm)** | **OG10** | | **OG14** | |
| 19 |  |  | 100 | 100 |
| 13.2 | 100 | 100 | 100 | 85 |
| 9.5 | 100 | 85 | 70 | 45 |
| 6.7 | 65 | 35 | 45 | 25 |
| 4.75 | 45 | 20 | 25 | 10 |
| 2.36 | 20 | 10 | 15 | 7 |
| 1.18 | 14 | 6 | 12 | 6 |
| 0.6 | 10 | 5 | 10 | 5 |
| 0.3 | 8 | 4 | 8 | 4 |
| 0.15 | 7 | 3 | 7 | 3 |
| 0.075 | 5 | 2 | 5 | 2 |

**(1)** Aggregate gradings with percentage passing sieve size (mm), in accordance with AS 1152.

**(2)** No RAP content is permitted for OG.

* 1. **Stone Mastic Asphalt**

Mix properties for the design and production control of Stone Mastic Asphalt (SMA) must meet the requirements of Table 4.7(a) "Mix Properties of Stone Mastic Asphalt". The grading envelopes must meet the requirements of Table 4.7(b) "Mix Grading Envelopes" and production tolerances on grading and binder content must comply with Table 11 in AS 2150.

The design of SMA must be to Medium Duty category (80 gyratory cycles), and must include a minimum of 0.3% (by mass) cellulose fibre. Details for filler and fibre type and source must be included in the nominated mix submission.

|  |  |  |
| --- | --- | --- |
| **TABLE 4.7(a) - MIX PROPERTIES OF STONE MASTIC ASPHALT** | | |
| **CHARACTERISTIC** | **SMA7** | **SMA10** |
| Nominal Mix Sieve Size (mm) | 6.7 | 9.5 |
| Hydrated Lime (%) - Minimum | 1.0 | 1.0 |
| Design Air Voids Target (%) | 3.5 | 3.5 |
| Production Air Voids Tolerance (%) | 3.0 – 5.0 | 3.0 – 5.0 |
| Binder Content Target (% by mass) | 7.0 | 6.5 |
| Binder Film Index (BFI) (µm) - Minimum | - | 9.5 |
| Indirect Tensile Strength (ITS) (kPa) | Report Only | Report Only |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TABLE 4.7(b) - MIX GRADING ENVELOPES** **(1) (2)** | | | | |
| **SIEVE (mm)** | **SMA7** | | **SMA10** | |
| 13.2 |  |  |  | 100 |
| 9.5 |  | 100 | 100 | 90 |
| 6.7 | 100 | 85 | 55 | 30 |
| 4.75 | 62 | 30 | 40 | 20 |
| 2.36 | 35 | 20 | 28 | 15 |
| 1.18 | 28 | 16 | 24 | 13 |
| 0.6 | 24 | 14 | 21 | 12 |
| 0.3 | 20 | 12 | 18 | 10 |
| 0.15 | 16 | 10 | 14 | 9 |
| 0.075 | 12 | 8 | 12 | 8 |

**(1)** Aggregate gradings with percentage passing sieve size (mm), in accordance with AS 1152.

**(2)** No RAP content is permitted for SMA.

* 1. **Job Mix Formula**

The nominated mix will be assessed by DPTI for compliance with the requirements of this Part. An Asphalt Mix Design Assessment will be supplied to the Contractor and will incorporate:

1. Mix Register Number.
2. Production grading tolerances.
3. A "Job Mix Formula" (JMF) comprising of Combined Grading, Binder Content, Max Density, Bulk Density, Design Target Air Voids, Binder Film Thickness, RAP & Rejuvenation Percentage, Indirect Tensile Strength & Resilient Modulus.
4. **Manufacture of Mixes**
   1. **General**

Mixes must be manufactured to replicate the JMF in accordance with AS 2150, Clause 7 "Manufacturing and Storage of Mix".

Mixes must not exhibit drainage of the binder and/or contain less than 95% of aggregate particles that are not fully coated with binder as determined by AS 2891.11.

Asphalt must be manufactured so that its properties comply with the requirements specified in Clause 12 "Verification Requirements and Records".

* 1. **Manufacturing Controls**

Plant temperatures and mixing times must be maintained in a range sufficient to ensure a homogenous mix without causing deleterious effects to the binder through overheating and within the manufacturer's specifications as detailed in AAPA Advisory Note 7. The binder temperature used for storage/transport must not exceed the values shown against the binder class indicated in Table 5.2.

|  |  |
| --- | --- |
| **TABLE 5.2 - MAXIMUM BINDER TEMPERATURE** | |
| **BINDER CLASS** | **MAX. TEMPERATURE(oC)** |
| 170 | 180 |
| 320 | 185 |
| 600 | 195 |

The above maxima may be increased by up to 10oC when additives such as polymers or scrap rubber are incorporated in the binder.

Spray temperature of the binder into a pugmill type environment must be such as to minimise oxidation or drainage of the binder.

The temperature of the mix delivered into each truck must be recorded on the weighnote.

* 1. **Manufacture of Mixes Including RAP**

In batch mixing plants, the RAP must be either:

1. metered into the asphalt plant after heating and drying of aggregates;
2. added directly to the weigh hopper with other aggregate materials, for each batch; or
3. weighed separately and added direct to the pugmill.

If necessary, batch mixing time must be increased to ensure adequate heat transfer and dispersion of RAP. In drum mixing plants, RAP must be protected from excessive temperatures by a combination of entry point to drum and shielding from direct flame contact.

* 1. **Manufacture of Asphalt with Additive or Foaming Technique**

Subject to prior approval, the Contractor may use an additive or foaming technique:

1. to manufacture at standard temperatures but air and pavement placement temperatures are reduced in Clause R28.(HMA),
2. to manufacture at standard temperatures but time until placement is extended and mix placement temperature reduced (HMA), or
3. to manufacture asphalt at lower temperatures (WMA).

Where placement temperature is reduced, compaction requirements must still be in accordance with Part R28 “Construction of Asphalt Pavements”.

The Contractor must provide the testing temperature of gyratory compaction when additives or foaming technique are used in accordance AS2891.2.2:2014.

The propriety product of the additive used must be fully disclosed in accordance with Clause 4.1 “Nominated Mixes”.

1. **production Sampling and Testing**
   1. **General**

The Contractor must conduct sampling and testing of asphalt and binder for control and verification purposes during manufacture. Minimum sampling and testing frequency for each mix type in a 24 hour period must be as shown in Table 6.1.

|  |  |  |  |
| --- | --- | --- | --- |
| **TABLE 6.1 - ASPHALT SAMPLING AND TESTING FREQUENCY** | | | |
| **Sampling & Testing**  **Frequency** | **Fixed Asphalt Plant**  **and approved**(1) **Process Control (tonne)** | **Fixed Asphalt Plant**  **without approved**(1)  **Process Control (tonne)** | **Mobile Asphalt Plant**  **(tonne)** |
| 1 | 30 - 150 | 30 - 100 | 0 - 30 |
| 2 | 151 - 400 | 101 - 250 | 31 - 100 |
| 3 | Additional sample/test each 300 tonne > 400 | 251 - 400 | 101 - 250 |
| 4 |  | Additional sample/test each 300 tonne > 400 | 251 - 400 |
| 5 |  |  | Additional sample/test each 300 tonne > 400 |

(1) As documented in Asphalt Mix Design Assessment

For Fine Dense Mixes meeting the requirements in this Part, sample rate is one per lot (a lot defined as a day’s production).

For Coarse Dense Mixes, Stone Mastic Asphalt & Open Graded Asphalt meeting the requirements of this Part, sample rate is in accordance Table 6.1 “Asphalt Sampling and Testing Frequency”.

The following tests & calculations must be performed and reported on each production sample:

1. Combined Grading;
2. Binder Content;
3. Maximum Density;
4. Bulk Density;
5. Air Voids;
6. Indirect Tensile Strength (ITS) (one test per mix per day only); and
7. Binder Film Index (BFI).

Test results and calculations of production mix must be supplied to the Principal within 24 hours.

* 1. **Audit Samples**

The Contractor must provide audit samples using DPTI’s random selection template for product auditing purposes in accordance MAT-PC063 “Random Sample Template” for the following:

1. Asphalt

From each production mix sample, the Contractor must provide a single sample (6L tin) of a minimum 11kg asphalt for retention by DPTI. These samples may be used for product auditing purposes.

The Contractor must submit asphalt audit samples using Random Sample Template (selection rate of 1 in 1).

1. Residual Bitumen

The Contractor must provide one sample per type per delivery (minimum of 1 litre) for product auditing purposes. Audit samples are not required where a DPTI arrangement exists.

1. Polymer Modified Binder

The Contractor must provide one sample per type per delivery (minimum of 1 litre) for product auditing purposes.

All samples must be delivered to DPTI’s Materials Laboratory at 19 Bridge Road, Walkley Heights at a minimum monthly intervals or as requested by the Principal. The Contractor may dispose remaining random asphalt samples after a minimum of 30 days.

All samples must be a minimum of 11 kg and clearly labeled on the side of the container in clear indelible ink or paper sticker and must include: materials, mix type, sample number, date of sampling and asphalt mix design register number and project.

The samples will be stored at DPTI’s expense. The Contractor must provide documentation to confirm that the samples have been received at DPTI’s Laboratory, and submit this as part of the Lot package. All samples must be clearly marked and traceable to the relevant Lot in accordance with Part G20 "Quality System Requirements".

1. **PROPERTy variations OF PRODUCTION ASPHALT**

In replicating the JMF properties, production mix variations must not exceed the limits shown in Table 11 of AS 2150.

Variations of the Production Air Voids from the Design Air Voids Targets must not exceed the Limits of Production Air Voids Tolerance in:

1. Table 4.3(a) "Mix Properties of Dense Mix Asphalt";
2. Table 4.4(a) "Mix Properties of Fine Dense Mix Asphalt";
3. Table 4.6(a) "Mix Properties of Open Graded Asphalt; and
4. Table 4.7(a) "Mix Properties of Stone Mastic Asphalt".

The Contractor must ensure moisture content of production asphalt to be less than 0.2%.

1. **STORAGE OF ASPHALT**

Asphalt must be stored in accordance with AS 2150, Section 7.5 “Storage of Mix”.

1. **DELIVERY OF MIX**

Mix must be transported to site in a manner which does not result in a deterioration of the properties of the mix or contamination of the mix. The Contractor must ensure that transport operations are arranged in a manner which ensures continuous placing of asphalt. If haulage distance is measured for the purpose of payment, the haulage distance must be calculated from the Nominated Asphalt Plant which is closest to the work site, regardless of whether it is sourced from any other plant for any reason (including breakdown). The haulage distance includes the loaded trip only and excludes the return trip.

1. **TEST PROCEDURES**

The Contractor must use the following test procedures available at <http://www.dpti.sa.gov.au/contractor_documents>

to verify conformance with this Part and Table 10.

| **TABLE 10 - TEST PROCEDURE** | **TEST PROCEDURE**  **No.** |
| --- | --- |
| Sampling of Raw Materials:   * Aggregates & Processed RAP * Bitumen & Polymer Modified Binder * Mineral Filler | TP 226  AS 2008  TP 226 |
| Sampling of Asphalt | TP 425 |
| Compaction of Asphalt Test Specimens using a Gyratory Compactor | TP 428 |
| Determination of the Maximum Density of Asphalt - Water Displacement Method (Duplicate sample testing not required) | AS 2891.7.1 |
| Bulk Density of Compacted Asphalt Specimens:   * Presaturation Method for Dense Graded and SMA * Mensuration Method for Open Graded | AS 2891.9.2  AS 2891.9.3 |
| Measurement of Thickness or Height of Compacted Asphalt | ASTM D3549 |
| Voids - Calculation | AS 2891.8 |
| Binder Film Index - Calculation | AS 2891.8 |
| Binder Content: - Pressure Filtration Method  - Ignition Oven Method | AS 2891.3.3  TP 473 |
| Stripping Potential of Asphalt – Tensile Strength Ratio (TSR) | AGPT/T232 |
| Static Indirect Tensile Test (ITS) | TP 460 |
| Extractions of Bituminous Binder from Asphalt | AGPT/T191 |
| Design of Bituminous Binder Blends to a Specified Viscosity Value | AGPT/T193 |
| Characterisation of the Viscosity of RAP Binder using the Shear Rheometer (DSR)  Asphalt Binder Viscosity | AGPT/T192  TP 664 |
| Asphalt Particle Loss | AGPT/T236 |
| Asphalt Binder Drain-Off | AGPT/T235 |
| Particle Size Distribution by Dry Sieving | AS 1141.11 |
| Voids in Dry Compacted Fillers | AS 1141.17 |
| Moisture Content | AS 2891.10 |
| Specific Surface | AS 2350.8 |
| Loss on Ignition | AS 3583.3 |
| Water Soluble Fraction of Filler | AS 1141.8 |
| Deformation Resistance of Asphalt Mixtures by the Wheel Tracking test | AGPT/T231 |
| Fatigue Fife of Compacted Bituminous Mixes Subject to Repeated Flexural Bending | TP477 |
| Determination of the Resilient Modulus of Asphalt – Indirect Tensile Method | AS2891.13.1 |

1. **HOLD POINTS**

The following is a summary of Hold Points referenced in this Part:

|  |  |  |  |
| --- | --- | --- | --- |
| **CLAUSE REF.** | **HOLD POINT** | **RELEASE RESPONSIBILITY** | **MAXIMUM RESPONSE TIME** |
| 2.0 | Submission of Quality Plan (if not provided previously) | Superintendent | 20 working days |
| 4.1.1 | Submission of the details of Nominated Mixes and Certificate(s) | DPTI | 20 working days |
| 4.1.2 | Submission of Job Mix Formula | DPTI | 15 working days |
| 4.1.4 | Submission of Trial mix data from a mobile plant | DPTI | As required |

1. **VERIFICATION REQUIREMENTS AND RECORDS**
   1. **Test Records & Verification for Asphalt Mix Design Initial Assessment**

The Contractor must undertake the testing specified in this Part & Table R27B(d) and must supply written evidence of compliance.

* 1. **Test Records & Verification for Plant Production**

The Contractor must undertake the testing specified in this Part and Table 12.2 this Clause and must supply written evidence of compliance within the Lot Package.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TABLE 12.2 - PLANT PRODUCTION TESTING** | | | | | |
| **CLAUSE REF.** | **SUBJECT** | **PROPERTY** | **TEST PROCEDURE** | **TEST FREQUENCY** | **ACCEPTANCE LIMITS** |
| 5.2 | Manufacturing Controls | Temperature at manufacture | Thermometer reading or infrared gun | Each truckload | Refer Clause 5.2 "Manufacturing Controls" |
| 6.0 | Production Sampling & Testing | Binder Content & Combined Grading | AS 2891.3.3 | Refer Clause 6.1 | Refer Clause 4.3, 4.4, 4.6 & 4.7 and Asphalt Mix Design Assessment |
| Bulk Density | AS 2891.9.2  AS 2891.9.3 | Refer Clause 6.1 | Report Only |
| Absorption of Compacted Specimens | AS 2891.9.2 | Refer Clause 6.1 | ≤ 2.0% for AC20  ≤ 1.0% for SMA |
| Maximum Density | AS 2891.7.1 | Refer Clause 6.1 | Report Only |
| Voids on Compacted Specimens | AS 2891.8 | Refer Clause 6.1 | Refer Clause 4.3, 4.4, 4.6 & 4.7 and Asphalt Mix Design Assessment |
| Binder Film Index (BFI) (1) | AS 2891.8 | Refer Clause 6.1 | Refer Clause 4.3, 4.4 & 4.7 |
| Indirect Tensile Strength (ITS) | TP 460 | Refer Clause 6.1 | Refer Clause 4.3 |

(1) Absorption for RAP component assumed to be zero.

**ATTACHMENT R27A**

**ASPHALT INSPECTION TEST AND VERIFICATION**

|  |  |  |  |
| --- | --- | --- | --- |
| **TABLE R27A(a) - PLANT INSPECTION SCHEDULE** | | | |
| **CONTROL AREA** | **INSPECTION/TEST** | **PURPOSE** | **FREQUENCY** |
| Cold feed bins | As set out in quality plan | To ensure correct feeding of plant | a) On installation.  b) As set out in quality plan. |
| Dryer Drum | As set out in quality plan | To ensure correct heating and drying of aggregates | As set out in quality plan |
| Hot feed bins | As set out in quality plan | To ensure correct batching | As set out in quality plan |
| Binder | Tank temperature  Penetration or softening point | To check storage temperature  To check for binder hardening(1) | a) Daily  b) In case of doubt |
| Additive Silos | As set out in quality plan | To ensure correct feed rates for additives | As set out in quality plan |
| Mixed asphalt | Temperature | To ensure temperature conforms | a) Every batch or continuously |

(1) Binder can harden during storage, particularly when circulated. The quality plan should state the ‘safe’ storage period for binder in its tank configuration and require testing if that period is exceeded without fresh deliveries. In the absence of other information, a period of two weeks should be adopted

|  |  |  |
| --- | --- | --- |
| **TABLE R27A(b) - INSPECTION AND TEST FREQUENCIES FOR ADDITIVES**(2) | | |
| **INSPECTION/TEST** | **PURPOSE** | **FREQUENCY** |
| Appropriate tests to determine intrinsic properties | To confirm characteristics of product or check compliance with specification | a) Source approval prior to initial use  b) As stated in the quality plan |
| Inspection of delivery ticket | To check that consignment is as ordered and from the correct source | Each delivery |
| Organoleptic check of consignment | For comparison with normal appearance | Each delivery, if practicable; otherwise in accordance with quality plan |

(2) This table may include the results of tests and inspections by the additive supplier as part of the Process Control System

| **TABLE R27A(c) - INSPECTION/TEST FREQUENCIES FOR ASPHALT TO BE DELIVERED** | | |
| --- | --- | --- |
| **PRODUCT INSPECTION/TEST** | **PURPOSE** | **FREQUENCY** |
| Organoleptic check on mixed asphalt | For comparison with normal appearance with respect to grading, evenness of mixing and adequacy of coating | Every load |
| Temperature | To ensure material conforms with Clause 5 or other requirements | a) As required under Process Control  b) Whenever samples are taken |
| Grading, Binder Content, Voids, Maximum Density and Binder Film Index | To ensure material conforms to Clause 4 |  |
| Other design characteristics | To assess conformity | As detailed in quality plan |
| Suitability of delivery vehicles by visual assessment | To check adequacy of insulation | Prior to first use and in case of doubt |
| Cleanliness of delivery vehicles by visual assessment | To avoid contamination | Every load prior to loading1 |

|  |  |  |  |
| --- | --- | --- | --- |
| **TABLE R27A(d) - PLANT CALIBRATION REQUIREMENTS** | | | |
| **ITEM OF PLANT** | **INSPECTION/TEST** | **PURPOSE** | **MINIMUM FREQUENCY** |
| **Weighing equipment** | Visual inspection | To ascertain that weighing equipment is functioning correctly | Daily |
|  | Testing of weighing accuracy | To ensure accuracy within quality plan requirements | a) On installation (3) b) Annually c) In case of doubt |
| **Admixture dispensers** | Organoleptic inspection | To ascertain that the dispenser is functioning correctly | First batch of the day containing admixture |
|  | Test for accuracy | To ensure accuracy within quality plan requirements | a) On installation (3) b) Annually c) In case of doubt |
| **Flow meters** | Comparison of the actual amount with the metered amount by reconciliation | To ensure accuracy within quality plan requirements | a) On installation (3) b) Annually c) In case of doubt |
| **Batching system  (on batch plants)** | Comparison of actual mass of constituents in the batch with the intended mass using the method prescribed in the quality plan | To ascertain the batching accuracy in accordance with the quality plan | a) On installation (3) b) Annually c) In case of doubt |
| **Proportioning system (on continuous plants)** | Comparison of actual mass in a measured period of time with the intended mass using the method prescribed in the quality plan | To ascertain the accuracy in accordance with the quality plan | a) On installation (3)  b) Annually c) In case of doubt |
| Temperature Monitoring equipment | Visual | To ascertain the equipment is functioning correctly | Daily |
| Test of accuracy | To ensure correct temperatures are recorded | a) On installation(3)  b) Annually c) In case of doubt |

(3) or after comprehensive repair.

**ATTACHMENT R27B**

**ASSESSMENT AND REGISTRATION OF ASPHALT MIX DESIGNS**

1. **SUBMISSION**

The Contractor must submit the mix design together with supporting documentary evidence and laboratory and plant test results for mix and material properties to DPTI.

The following details of Nominated Mix (NM) must be submitted:

1. Constituent materials:
   1. Aggregates ‑ source, geological type,
   2. Added Mineral Filler ‑ type, source
   3. Binder ‑ source, class or grade,
   4. Bitumen Adhesion Agent ‑ name, type, source, SDS,
   5. Relevant test results verifying material properties for the above mentioned materials.
2. Mix Design:

|  |
| --- |
| 1. Design mix maximum density. |
| 1. Nominated combined aggregate grading and binder content. 2. Test results of the properties in tables of Clause 4 – “Mix Requirements” of each nominated mix. |
| 1. Details of mixing plant location, description capacity, history and any relevant information in accordance Clause 2 “Quality Requirements”. |

1. Test Results of representative material of each nominated mix produced by the mixing plant from which the asphalt is to be supplied.
2. Manufacturer’s instructions of any additive including submission of SDS.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TABLE R27B(a) - NOMINATED MIXES - TESTING REQUIREMENTS** | | | | | | | | | |
| **CHARACTERISTIC (1)** | **FineAC7** | **FineAC10** | **AC10** | **SMA7** | **SMA10** | **AC14** | **OG10** | **OG14** | **AC20** |
| **Gyropac Gyratory Compaction** | | | | | | | | | |
| Raw Aggregate Grading –Individual Sizes (%) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Total Aggregates, Sand & Fillers Absorption (%) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Mix Design Proportions | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Combined Gradings (%) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Maximum Density (t/m3) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Voids (%) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Binder Content (%) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Binder Film Thickness (BFT) (µm) | YES | YES | YES | YES | YES | YES | NO | NO | YES |
| Indirect Tensile Strength (ITS) (kPa) | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Tensile Strength Ratio (TSR) (3) (%) | YES | YES | YES | NO | NO | YES | NO | NO | YES |
| RAP (%) and Viscosity Treatments | YES | YES | YES | NO | NO | YES | NO | NO | YES |
| Viscosity (pa.s) **(2)** | YES | YES | YES | NO | NO | YES | NO | NO | YES |

(1) Including asphalt dense mixes containing RAP and WMA.

(2) For asphalt dense mixes containing RAP in accordance Clause 4.5.

(3) Tensile Strength Ratio testing must be added to laboratory mix design for mobile plants and must exceed 75%.

Testing must be carried out on representative material of each NM progressively of:

1. Laboratory prepared mix; and
2. Plant prepared mix from which the asphalt is to be applied.

When requested, the Contractor must submit a sample of 100 kg of loose asphalt of the nominated mix for verification of performance testing undertaken by DPTI.

1. **NOMINATED MIX PERFORMANCE TEST REQUIREMENTS**

The Contractor must conduct testing on plant produced mix upon receipt of Asphalt Mix Design Assessment in accordance with Tables R27B(b) & R27B(c).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TABLE R27B(b) - NOMINATED MIXES - MIX PERFORMANCE TEST PROPERTIES** | | | | | |
| **ASPHALT MIX**  **CHARACTERISTIC** | | **WHEEL TRACKING** | **FLEXURAL FATIGUE**  **DPTI: TP477** | **RESILIENT MODULUS (1)** | **MINIMUM TESTING FREQUENCY**  **(per Calendar Year)** |
| **No.** | **Mix Type**  **(including RAP & WMA)** | **AG:PT/T231 (mm)** | Minimum MICRO-STRAIN @ 1 Million Cycles | **AS2891.13.1 (MPa)**  ± 1,000 MPa |
| 1  2  3 | AC10M320  AC14M320  AC20M320 | 3.0 ≤ WT ≤ 6.0  3.0 ≤ WT ≤ 6.0  3.0 ≤ WT ≤ 6.0 | 180 µɛ  170 µɛ  150 µɛ | 4,800 MPa  4,600 MPa  4,300 MPa | The Contractor shall carry out performance testing if the total asphalt amount is greater than 5,000t per mix per calendar year or for special asphalt mixes including SMA10 or as requested by DPTI Asphalt Engineer.  Shall also carry out additional performance testing for every 20,000t per mix per calendar year. |
| 4 | AC14H320 | ≤ 3.0 | 160 µɛ | 4,300 MPa |
| 5 | AC14M320H | ≥ 6.0 | 200 µɛ | 5,200 MPa |
| 6  7 | AC10H35P  AC14H35P | ≤ 2.0  ≤ 2.0 | 160 µɛ  150 µɛ | 6,000 MPa  5,800 MPa |
| 8  9 | AC10H15E  AC14H15E | ≤ 3.0  ≤ 3.0 | 300 µɛ  290 µɛ | 2,700 MPa  2,700 MPa |
| 10  11 | AC10M35P  AC14M35P | ≤ 3.0  ≤ 3.0 | 170 µɛ  160 µɛ | 5,500 MPa  5,300 MPa |
| 12  13 | AC10M15E  AC14M15E | ≤ 4.0  ≤ 4.0 | 330 µɛ  310 µɛ | 2,400 MPa  2,500 MPa |
| 14  15 | AC10M5EP  AC14M5EP | ≤ 2.0  ≤ 2.0 | 450 µɛ  390 µɛ | 6,000 MPa  6,100 MPa |
| 16  17  18 | SMA7M15E  SMA10M15E  SMA10M5EP | -  ≤ 3.0  ≤ 3.0 | -  350 µɛ  250 µɛ | -  2,000 MPa  5,000 MPa |

The Nominated Mixes must be tested as required by Table R27B(c) and to meet the requirements of R27B(b).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TABLE R27B(c) - NOMINATED MIXES - TESTING REQUIREMENTS** | | | | | | | | | |
| **CHARACTERISTIC(1)** | **FineAC7** | **FineAC10** | **AC10** | **AC14** | **AC20** | **SMA7** | **SMA10** | **OG10** | **OG14** |
| **Gyratory Compaction** | | | | | | | | | |
| **Tensile Strength Ratio** (TSR) (%) | NO | NO | YES | YES | YES | NO | NO | NO | NO |
| **Slab Compaction** | | | | | | | | | |
| **Resilient Modulus** | NO | NO | YES | YES | YES | YES | YES | NO | NO |
| **Flexural Fatigue** | NO | NO | YES | YES | YES | YES | YES | NO | NO |
| **Wheel Tracking** | NO | NO | YES | YES | YES | YES | YES | NO | NO |

(1) Including asphalt dense mixes containing RAP and WMA.

1. **ASPHALT MIX DESIGN ASSESSMENT PROGRESSION**

The following general stages apply to an asphalt mix design:

1. Laboratory assessment,
2. Plant production assessment,
3. Performance testing assessment,
4. Field Inspection (for surface course mixes).

On an ongoing basis, the following applies to an asphalt mix design:

1. Plant production assessment including process control monitoring,
2. Performance testing on a minimum yearly basis.

If at any stage DPTI deems a mix to be unsatisfactory, the registration may be withdrawn as indicated in Clause R27.4.1.3 “Variations to Nominated Mixes”.

1. **LABORATORY ASSESSMENT**

The laboratory mix design must incorporate the requirements of Clause R27.4 including following minimum requirements:

1. Design grading curve based on raw aggregate gradings,
2. Five point binder content verses voids laboratory analysis (washout binder content not required) using standard bitumen,
3. Determination of design binder content at required target air voids,
4. Provision of all R27.4.8 requirements
5. Plant trial of mix to verify aggregate gradings and design binder content,

The Contractor must undertake the testing specified in this Part & Table R27B(d) and submit the mix design together with supporting documentary evidence and laboratory and plant test results for mix and material properties to DPTI.

| **TABLE R27B(d) – INITIAL MIX DESIGN TESTING** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **CLAUSE REF.** | **SUBJECT** | **PROPERTY** | **TEST PROCEDURE** | **TEST FREQUENCY** | **ACCEPTANCE LIMITS** |
| 3.1 | Materials for Asphalt | Binder, Flux and Cutter | Refer Clause 3.1 | Refer Clause 3.1 | Refer Clause 3.1 |
| Aggregate, Sands & Mineral Filler | Refer Clause 3.1 | Refer Clause 3.1 | Refer Clause 3.1 |
| Hydrated Lime | Refer Clause 3.1 | Refer Clause 3.1 | Refer Clause 3.1 |
| 3.2 | Reclaimed Asphalt Pavement Material (RAP) | Binder Content (wash out) & Grading | AS 2891.3.3 | Refer Clause 3.2 | Report Only |
| Asphalt Binder Viscosity | TP 664 | Refer Clause 3.2 | Report Only |
| Moisture Content | AS 1289.B1.3 | Refer Clause 3.2 | Report Only |
| 4.0 | Mix Requirements | Total Absorption by  Combined Agg. | AS 2891.9.2 | Attachment R27B | Report Only |
| Mix Design Proportions | Refer PC044 | Attachment R27B | Report Only |
| Binder Content & Combined Grading | AS 2891.3.3 | Attachment R27B | Refer Clause 4.3, 4.4, 4.6 & 4.7 and Asphalt Mix Design Assessment |
| Bulk Density | AS 2891.9.2  AS 2891.9.3 | Attachment R27B | Report Only |
| Absorption of Compacted Specimens | AS 2891.9.2 | Refer Table 6.1 | ≤ 2.0% for AC20  ≤ 1.0% for SMA |
| Maximum Density | AS 2891.7.1 | Attachment R27B | Report Only |
| Voids on Compacted Specimens | AS 2891.8 | Attachment R27B | Refer Clause 4.3, 4.4, 4.6 & 4.7 and Asphalt Mix Design Assessment |
| Void in Mineral Aggregate (VMA) | AS 2891.8 | Attachment R27B | Refer Clause 4.3 & 4.4 |
| Tensile Strength Ratio (TSR) | AGPT/T232 | Attachment R27B | Refer Clause 4.3 & 4.4 |
| Binder Film Index (BFI) | AS 2891.8 | Attachment R27B | Refer Clause 4.3 & 4.4 |
| Indirect Tensile Strength (ITS) | TP 460 | Attachment R27B | Refer Clause 4.3 |
| Viscosity of the Binder of the Combined Mix Containing RAP | AGPT/T192 | Attachment R27B | Refer Clause 4.5 |

DPTI will compare the mix design and test results submitted with the requirements contained in:

1. Parts R15 & R27.
2. AS 2150, Sections 4, 5 and 6.
3. AGPT04B-14 Guide to Pavement Technology – Part 4B: Asphalt.
4. **PLANT PRODUCTION ASSESSMENT**

The Contractor must submit all production test data to DPTI and the following analysis:

1. Sieve data is within the design grading curve envelope;
2. Binder content and air voids meet the nominated binder content; and
3. Constructed pavement air voids confirm mix design suitability.

When satisfied that the mix meets the specified requirements, DPTI will note the summary of test results and give notice for performance testing via the Asphalt Mix Design Assessment.

1. **INITIAL PERFORMANCE TESTING ASSESSMENT**

The Contractor must undertake performance testing on the NM and submit performance test results to DPTI.

1. **REGULAR MIX DESIGN ASSESSMENT**

The Contractor must submit asphalt plant production test data and material test data to DPTI to support the NM.

The Contractor must demonstrate to DPTI the following:

1. The average air voids determined from production tests per mix are within ± 0.2% from target for 25 consecutive discrete samples.
2. The average binder content determined from production tests per mix must not be lower than 0.05% from the nominated binder content for 25 consecutive discrete samples.
3. **REGULAR PERFORMANCE TESTING ASSESSMENT**

Performance testing must be undertaken in accordance with Tables R27B(a) and R27B(b) and submit them to DPTI.

1. **Registration**

DPTI will maintain a register of assessed asphalt mixes. DPTI will not issue additional mix register numbers if asphalt mixes are equal or less than 10% RAP incorporation, Warm Mix Asphalt Additives or Foaming Technique are used. The “Mix Design Assessment” will consist of 5 pages, with a summary page that can be issued to the client. The “Registered Mix” number will be of the form:

AASSDBBBZ-CCC-XXXX

where: AA = Mix Type

SS = Nominal Mix Size (mm)

D = Duty Type

B = Binder Type

Z = additional suffix, e.g., L for Hydrated Lime, R for Regular, H for High Binder, and for inclusion of RAP, each 5% is given a number (1 to 9 for 5% through 45%).

CCC = Contractor’s name and plant

TXXX = sequential number for each mix combination, beginning at T001

\_\_\_\_\_\_\_\_\_\_\_\_\_