

Technical Note 148

Asphalt Mix Design Registration

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1 Introduction

This Technical Note has been prepared to assist Prequalified Asphalt Contractors (PAC) with registering asphalt mix designs with the Department of Transport and Main Roads. However, registration does not attest to the production, delivery, placement or compaction of the mix and does not guarantee the handling properties or performance of the mix.

2 Definition of terms and symbols

The terms used in this Technical Note are as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Additional terms used in this Technical Note shall be as defined in Table 2.

Table 2 – Definition of terms

Term	Definition
PAC	A Prequalified Asphalt Contractor is one who has been approved through a special asphalt category of the National Prequalification System (NPS) at one of the four levels (A1 to A4)
RAP	Reclaimed Asphalt Pavement
EME2	EME2 is a high performance base course asphalt mix intended for use in heavy duty pavements.
PSTS	Asphalt Project Specific Technical Specifications are intended for project specific works such as crumb rubber modified asphalt not covered by MRTS30 <i>Asphalt Pavements</i> .
Asphalt Mix Design Registrar	The Principal Engineer (Asphalt and Surfacing – Pavements, Research and Innovation) or their delegate who is responsible for assessing and registering asphalt mix designs for Transport and Main Roads.

3 Asphalt mix design registration

The intent of the mix design registration process is to ensure asphalt mixes are designed and can be produced by a registered manufacturing plant to comply with the requirements of the relevant specifications. Mix designs will be registered if the requirements of the relevant asphalt Technical Specification are satisfied, and the mix design submission contains all required details as described in this Technical Note. Registration of a mix design will result in the mix design being listed on the asphalt mix design register located on the Transport and Main Roads website

<https://www.tmr.qld.gov.au/business-industry/business-with-us/approved-products-and-suppliers>. The mix design register is updated regularly to include newly registered or re-registered mix designs.

Where the PAC is unable to provide a demonstrated history of compliance with the requirements of the relevant asphalt Technical Specification for a particular mix type, Transport and Main Roads reserves the right to undertake an audit of the registered manufacturing plant and processes prior to registration of the mix design.

Asphalt mix designs can be registered with Transport and Main Roads to the following Technical Specifications:

- MRTS30 *Asphalt Pavements*
- MRTS32 *High Modulus Asphalt* (EME2) and
- Project Specific Technical Specifications (PSTS).

Mix designs are registered for a period of two years from the date of initial submission.

4 Asphalt manufacturing plant registration

Asphalt mix designs registered with Transport and Main Roads must be manufactured by a registered asphalt plant. The process of registering an asphalt plant involves:

- the PAC submitting technical details of the manufacturing plant to the Asphalt Mix Design Registrar, and
- an inspection and production audit of the manufacturing plant by the Asphalt Mix Design Registrar or their representative.

Once the Asphalt Mix Design Registrar is satisfied that the manufacturing plant is capable of producing a consistent and compliant asphalt mix, the PAC will be notified, and a unique plant registration number allocated. Asphalt mix designs will not be registered until the manufacturing plant is registered.

Any changes made by the PAC to the registered manufacturing plant that could impact of the ability to consistently produce a conforming mix design, must be communicated to the Asphalt Mix Design Registrar. A subsequent plant inspection and/or production audit of the manufacturing plant may be required to confirm the ability of the plant to produce a consistent, compliant asphalt mix.

5 Submission of the mix design

5.1 General

Mix design submissions must be sent to the Asphalt Mix Design Registrar at the following email address: asphaltmixdesign@tmr.qld.gov.au.

The applicant should allow not less than 14 days for the mix design to be reviewed, provided the mix design submission complies with the requirements of this Technical Note and the relevant Technical Specifications. If the initial mix design submission is assessed by the Asphalt Mix Design Registrar as not complying with the requirements of the relevant Technical Specification, the applicant will be advised, and the mix design review period will recommence on the date of resubmission. For the above reason, it is recommended that the mix design submission be received by the Asphalt Mix Design Registrar not less than 28 days prior to the commencement of production.

Not more than one asphalt mix design may be registered for a specific plant, constituent materials, mix type, nominal size, binder grade / class, and laboratory compaction method combination at any one time.

After reviewing of the mix design submission, the Asphalt Mix Design Registrar may request the applicant to supply individual mix components and/or mix or undertake testing to verify the mix design properties.

5.2 Mix designs registered to MRTS30

5.2.1 General

To register an asphalt mix design to MRTS30 *Asphalt Pavements* (dense graded, stone mastic and open graded), the PAC must conduct a production trial to demonstrate the mix design fully complies with the requirements of the Technical Specification. For mix design submissions that are based on laboratory prepared mix instead of production mix, usage on Transport and Main Roads projects is restricted to a maximum of 500 tonnes until such time that production mix test results, demonstrating compliance with specification requirements, have been submitted and reviewed by the Asphalt Mix Design Registrar.

The PAC must allow at least 14 days for the Asphalt Mix Design Registrar to review and consider these test results and update the registration status of the mix design (if appropriate). Where laboratory prepared mix is used for the mix design submission, the binder content and particle size distribution of the combined aggregate and filler must be consistent with the nominated design target and have air voids in laboratory compacted specimens within the following range:

- a) Dense graded asphalt: 4.0 – 5.5%
- b) Stone mastic asphalt: 3.0 – 4.0%, and
- c) Open graded Asphalt: $\geq 21.0\%$.

5.2.2 Asphalt mix design submission requirements

The following information must be included in the asphalt mix design submission:

- a) Details of constituent materials:
 - i. quarry registration certificate for each coarse and fine aggregate source
 - ii. recycled glass aggregate production procedure (where applicable)
 - iii. added filler: type, grade and source for each filler
 - iv. binder: source and class or grade
 - v. RAP material: particle size distribution and binder content. Where the PAC proposes to include more than 15% RAP in the mix, the requirements of Technical Note TN183 *Use of High Percentages of Reclaimed Asphalt Pavement (RAP) Material in Dense Graded Asphalt* must be followed, and
 - vi. additives: type, source, trade name and manufacturer's recommendations.
- b) Details of mix design:
 - i. proportion of each constituent as a percentage by mass of total mix
 - ii. where RAP material is a constituent, a copy of the PAC's RAP Management Plan.
 - iii. for each asphalt mix design, the nominated values and allowable tolerances, where required, for each requirement for the asphalt specified in Clause 7.2 of MRTS30 *Asphalt Pavements*
 - iv. binder content, maximum density, and tabulated particle size distribution as required by the limits of Table 7.2.1.1(a) or Table 7.2.1.1(b) (as relevant) of MRTS30 *Asphalt Pavements* and the production tolerances of Table 7.4.3.2 of MRTS30 *Asphalt Pavements*

- v. registration number of the asphalt mixing plant, and
 - vi. temperature at which the asphalt is to be manufactured.
- c) A completed mix design submission spreadsheet in accordance with the requirements of Clause 4.7, together with supporting test results provided by a NATA registered laboratory demonstrating the constituent materials and mix design complies with the requirements of *MRTS30 Asphalt Pavements*, and
- d) A mix design certificate complying with the requirements of Clause 4.8.

5.2.3 Asphalt production trial and testing requirements

A production trial must be undertaken for each mix design to demonstrate it fully complies with the requirements of *MRTS30 Asphalt Pavements*.

All production trial test results must be from one trial batch and be carried out within a 3-month period prior to the date of submission to the Asphalt Mix Design Registrar. The tests on the constituent materials must represent the materials used in this trial batch and be carried out within a 12-month period prior to the date of submission to the Asphalt Mix Design Registrar.

All phases of any particular test must be performed at the same laboratory.

5.3 Mix designs registered to MRTS32

5.3.1 General

To register an EME2 asphalt mix design, the PAC must conduct:

- a laboratory-based assessment to demonstrate the mix design fully complies with the requirements of *MRTS32 High Modulus Asphalt (EME2)*, and
- a production trial to demonstrate the capability of the registered manufacturing plant to produce the mix design.

An EME2 asphalt mix design can be registered based on a laboratory-based assessment only. However, usage is restricted to a maximum of 500 tonnes on Transport and Main Roads projects until such time that production mix test results are submitted and reviewed by the Asphalt Mix Design Registrar. The PAC must allow at least 14 days for the Asphalt Mix Design Registrar to review and consider these test results and update the registration status of the mix design (if appropriate).

5.3.2 Mix design submission requirements

The following information must be included in the mix design submission:

- a) Details of constituent materials:
 - i. quarry registration certificate for each coarse and fine aggregate source
 - ii. recycled glass aggregate production procedure (where applicable)
 - iii. added filler: type, grade and source for each filler
 - iv. binder: source and class or grade
 - v. RAP material: particle size distribution, binder content and the penetration at 25°C and softening point of the recovered RAP binder, and
 - vi. additives: type, source, trade name and manufacturer's recommendations.

- b) Details of mix design:
- i. proportion of each constituent as a percentage by mass of total mix
 - ii. where RAP material is a constituent, a copy of the PAC's RAP Management Plan
 - iii. for each nominated mix design, the nominated values and allowable tolerances, where required, for each requirement for the asphalt specified in Clause 7.2 of MRTS32 *High Modulus Asphalt* (EME2)
 - iv. binder content, maximum density, and tabulated particle size distribution and the production tolerances of Table 7.4.3.2 of MRTS30 *Asphalt Pavements*
 - v. type and identification number of the asphalt manufacturing plant, and
 - vi. temperature at which the asphalt is to be manufactured.
- c) A mix design submission spreadsheet in accordance with the requirements of Clause 4.7, together with supporting test results including:
- i. Test results of the laboratory-based assessment including:
 - Test results provided by a NATA registered laboratory demonstrating that the coarse aggregate, fine aggregate, filler and binder comply with the requirements of Clause 7.1 of MRTS32 *High Modulus Asphalt* (EME2).
 - Test results provided by a NATA registered laboratory demonstrating that the mix design complies with the requirements of Clause 7.2 of MRTS32 *High Modulus Asphalt* (EME2).
 - ii. Test results of the production trial including:
 - Test results provided by a NATA registered laboratory demonstrating that particle size distribution, binder content, maximum density, and proportions of constituents of the production mix are in compliance with the nominated mix design.
- d) A mix design certificate complying with the requirements of Clause 4.8.

EME2 mix designs that contain up to 15% RAP can be registered, based on the mix design test results for the 0% RAP mix RAP, provided:

- a) the binder content and particle size distribution is the same as the 0% RAP design, and
- b) the test properties for the mix design without RAP complies with the following requirements:
 - i. flexural stiffness $\geq 14,500$ MPa
 - ii. fatigue resistance ≥ 160 $\mu\epsilon$ at 1 million cycles, and
 - iii. richness modulus ≥ 3.5 .

A separate production trial is required for each mix.

5.3.3 EME2 mix design testing and production trial requirements

The tests on the constituent materials must represent the materials used for the laboratory-based mix design assessment and the production trial and be carried out within a 12-month period prior to the date of submission to the Asphalt Mix Design Registrar.

All tests relating to the mix design submission must be carried out within a 3-month period prior to the date of submission to the Asphalt Mix Design Registrar. All phases of any particular test must be performed at the same laboratory.

A production trial must be undertaken for each mix design to demonstrate the capability of the registered manufacturing plant to produce the mix design. Particle size distribution, binder content, and maximum density of the production mix must be tested and the proportions of constituents recorded. All test results must be from one trial batch.

5.4 Mix designs registered to Project Specific Technical Specifications (PSTS)

To register an asphalt mix design to a PSTS, the requirements for mix designs registration to MRTS30 *Asphalt Pavements* shall apply unless specifically stated otherwise in the PSTS.

5.5 Asphalt Mixes containing > 15% RAP

Where the PAC proposes to include more than 15% RAP in the mix, the PAC must obtain the RAP approval at a level that is commensurate with the RAP content contained in the proposed mix design before it can be registered. The requirements associated with each RAP approval level are outlined in MRTS30 *Asphalt Pavements* and TN183 *Use of High Percentages of Reclaimed Asphalt Pavement (RAP) Material in Dense Graded Asphalt*.

The PAC must nominate the method (Method 1 or Method 2) of managing the viscosity of the binder blend on the mix design certificate and be the same as that used for the RAP approval level assessment. The mix design certificate must nominate the binder type which will include the target binder class in addition to the virgin binder. e.g., C600 (C320 + 25% RAP).

Method 1 can be used by A3 and A4 PACs whereas Method 2 can only be used by A4 PACs.

5.6 Additives

5.6.1 General

Where a registered mix design is varied by the inclusion of a warm mix asphalt additive, registration of the mix design (with the warm mix asphalt additive included) may be granted without the need for a production trial (for asphalt mix designs other than EME2) or laboratory based assessment (for an EME2 asphalt mix design) provided the PAC can demonstrate a history of compliance with the requirements of MRTS30 *Asphalt Pavements* or MRTS32 *High Modulus Asphalt (EME2)* (as relevant) for the particular warm mix asphalt additive and mix type.

5.6.2 Warm mix asphalt additives

When using warm mix asphalt additives, the PAC must provide details of the additive(s) nominated in the mix design submission. In addition, evidence acceptable to the Asphalt Mix Design Registrar that the additive has proven performance for the purpose described in MRTS30 *Asphalt Pavements* or MRTS32 *High Modulus Asphalt (EME2)* (as relevant) must be provided.

The proposed mix design will not be registered if the nature, intended purpose and dosage of the warm mix asphalt additive are not clear in the nominated mix design submission. The submission must clearly state:

- a) any proposed amendments to the mix design procedure, operational processes and/or test methods as a result of the inclusion of a warm mix asphalt additive, and
- b) the classification of the warm mix asphalt additive (refer to Table A1).

Where a warm mix asphalt additive is included in the mix design and the PAC proposes to use a lower temperature than that specified in test method Q305 or AS/NZS 2891.2.2 (as appropriate) for the compaction of laboratory specimens, test method Q323 results must be included in the mix design submission demonstrating the suitability of the temperature to be adopted. The temperature must be stated on the mix design certificate.

5.6.3 Asphalt rejuvenating oil

When using an asphalt rejuvenating oil in dense graded asphalt mixes containing > 15% RAP, the PAC must provide details of the rejuvenating oil nominated in the mix design submission. In addition, evidence acceptable to the Asphalt Mix Design Registrar that the additive has proven performance for the purpose described in MRTS30 *Asphalt Pavements* must be provided.

5.7 Asphalt mix design submission spreadsheet

Transport and Main Roads has developed a range of mix design submission spreadsheets to assist PACs to demonstrate their mix design complies with all of the requirements of MRTS30 *Asphalt Pavements* or MRTS32 *High Modulus Asphalt (EME2)* (as relevant).

The PAC must complete the relevant sections of the asphalt mix design submission spreadsheet for each mix design submission and attach all corresponding test reports and supporting documentation pertaining to the submission.

A current version of the mix design submission spreadsheet can be obtained by email from asphaltmixdesign@tmr.qld.gov.au.

5.8 Asphalt mix design certificate

5.8.1 General

The PAC must include in the asphalt mix design submission, a mix design certificate, signed by the PAC's mix designer, certifying that the mix design complies with the requirements of MRTS30 *Asphalt Pavements*, MRTS32 *High Modulus Asphalt (EME2)* or the relevant PSTS (as relevant).

The mix design certificate must be based on the mix design certificate template which can be obtained by email from asphaltmixdesign@tmr.qld.gov.au and detailed in the Appendices of this Technical Note and must contain the following information:

- a) PAC's company name
- b) registered asphalt plant location and identification number
- c) mix design code (numbers allocated to specific PACs are available in the Asphalt Mix Design Register available on the Transport and Main Roads website <http://www.tmr.qld.gov.au>.)
- d) Technical Specification that the mix design complies with
- e) description of all constituent materials, their sources (including the RQ number of the registered quarry) grade / class (for binder) and proportions within the mix
- f) target grading, binder content and maximum density as well as their job limits for the mix design
- g) method of compaction used to determine air voids in laboratory compacted specimens for asphalt mix designs other than EME2 (i.e., Marshall compaction (75 blows), Marshall compaction (50 blows), or Gyratory compaction (120 cycles))

- h) specification requirements (if any) that the mix design does not comply, and
- i) a statement outlining where the mix design fully conforms or departs from the requirements of the relevant specification. For example:
 - i. "I certify this mix design complies with the requirements of MRTS30 *Asphalt Pavements*."
 - ii. "I certify this mix design complies with the requirements of MRTS30 *Asphalt Pavements* except that Incorporation of this design into the works will require acceptance by the Administrator prior to use as per Hold Point 3 of MRTS30 *Asphalt Pavements*."

5.8.2 Asphalt mix design code

The mix design code is specific in its structure and must comply with the following requirements:

- a) Identify the manufacturer and the type of asphalt using the abbreviations designated in Appendix A, B and C e.g. "MAN: AC10M".
- b) A two-digit number representing the year of the asphalt mix design registration e.g. "15".
- c) A unique four-digit number followed by the applicable binder type(s) for the mix design in brackets e.g. "1234(320, 600, A15E)". Each PAC has been allocated a unique set of four-digit numbers to use for their mix designs. These numbers are listed on the Asphalt Mix Design Register.
- d) May also contain additional components to further indicate specific elements of the mix design (see Appendix A). Each additional component must be presented in individual brackets between the unique four-digit number and the binder type(s). Refer to the complete example below.

For example, an AC10M mix design submitted in 2015, with a unique four-digit number of 1234 that contains 15% RAP and a water-based warm mix asphalt would have the following mix design code:

MAN: AC10M/15/1234(15R)(F)

5.8.3 Aggregates and fillers

The material source for all mix components must be noted on the mix design certificate. A specific naming convention is employed to facilitate a consistent approach to identifying sources. The following list provides details on how to identify sources for different mix components:

- a) aggregate sources: the name utilised in the Quarry Registration System (QRS), for example - Moy Pocket Quarry
- b) recycled glass aggregate sources: the company name followed by the location in brackets, for example – iQ Renew (Wacol)
- c) crusher dust / manufactured sand sources: the name utilised in the QRS. If the quarry has multiple rock types, the rock type that must be incorporated into the mix must be placed in brackets, for example - Narangba Quarry (Hornfels)
- d) sand sources: the company or quarry name followed by location in brackets, for example - Metalia Sands (Maryborough)
- e) hydrated lime sources: the company name followed by location in brackets, for example - Graymont (Tamaree / Attunga)

Multiple sources of hydrated lime may be listed on the mix design certificate provided the PAC submits documented evidence demonstrating that:

- a) Each source complies with the specification requirements.
- b) Different filler source(s) will not affect the properties of the mix. Evidence would include evaluating the differences between voids in dry compacted filler and apparent particle density test results for the filler sources, and then assessing the effect of these differences on mix properties.
- c) The combined filler, for each listed hydrated lime source, complies with the voids in dry compacted filler minimum specification requirement.

Baghouse fines need not be listed on the mix design certificate where the fines are:

- a) reincorporated into the mix through a continuous closed loop process (e.g., Astec drum plants), or
- b) metered back into the mix (e.g., Ammann batch plant) and the fines have been derived from asphalt mixes containing the same constituent materials as the asphalt mix being manufactured.

However, baghouse fines must be listed on the mix design certificate where the fines have been derived from asphalt mixes that contain different constituent materials to those contained in the asphalt mix being manufactured or have been imported from a different asphalt manufacturing plant. In such cases, the source of the baghouse fines (e.g., asphalt manufacturing plant, mix code number(s), or aggregate and/or filler source) must be listed on the mix design certificate.

5.8.4 Binders

The naming convention for binder sources should be: binder supplier followed by location in brackets, for example – Puma (Pinkenba) / SAMI (Port of Brisbane).

More than one binder grade / class may be listed on the mix design certificate for the following mix types:

- Medium duty dense graded asphalt
- Heavy duty dense graded asphalt where gyratory compaction is used to demonstrate conformance with Table 7.2.2 of MRTS30 *Asphalt Pavements*, and
- Heavy duty dense graded asphalt where Marshall compaction (50 blows per face) is used to demonstrate conformance with Table 7.2.2 of MRTS30 *Asphalt Pavements*, and conformance with Table 7.2.7 of MRTS30 *Asphalt Pavements* is demonstrated:
 - For each grade / class of binder, or
 - Where a harder (i.e., more deformation resistant) binder is proposed, deformation resistance testing of the mix containing this binder is not required where a softer (i.e., less deformation resistant) binder has already demonstrated the performance required of the harder binder.
 - e.g., For an AC14H design with both C320 and A15E binder:
 - Testing of the mix with A15E binder is required where the final rut depth of the mix with C320 binder is > 2.0 mm and ≤ 3.5 mm

- Testing of the mix with A15E binder is not required where the final rut depth of the mix with C320 binder is ≤ 2.0 mm.

Compliance of the mix design with the specified moisture sensitivity requirements with binder classes / grades not used for the production trial will be demonstrated during the first production lot for the works.

For an EME2 asphalt mix design, only the binder class and source used for the mix design must be listed on the mix design certificate.

5.9 Registration for multiple plants

For asphalt mix designs other than EME2, where a PAC requests registration of a mix design for production from more than one plant, testing for resilient modulus, deformation resistance, asphalt particle loss, mix volume ratio and Marshall stability, stiffness and flow (where applicable) only needs to be completed on mix from one of the plants.

Registration of a mix design may also be granted for production from an additional plant (without the need for a production trial at this plant) provided the PAC can demonstrate:

- the plants are similar in their configuration and operation (as determined by the asphalt mix design registrar), and
- there is a proven history of compliance with the requirements of MRTS30 *Asphalt Pavements* or MRTS32 *High Modulus Asphalt* (EME2) (as relevant) for the particular mix type at the additional plant's current location.

6 Re-registration of mix designs

6.1 General

An existing mix design, that holds current registration, can be revised at any time without the need for a full mix design submission. Only the mix design certificate and test results relating to the design revision need be included as part of the revised mix design submission.

A full mix design submission is required to renew the registration of an existing mix design. However, where the PAC submits their aggregate, filler and RAP test results to the asphalt mix design registrar on an annual basis (as a separate submission), mix designs may be registered for a period of three years from the date of initial submission as opposed to the standard 2 years.

For re-registration of existing EME2 mix designs, the PAC may use production prepared mix to demonstrate the mix continues to conform with the performance properties listed in Table 7.2.1 of MRTS32 *High Modulus Asphalt* (EME2) provided the mix design complies with the following requirements:

- a) the binder content and particle size distribution of the mix design remain unchanged, and
- b) the properties of the design mix, when initially tested using laboratory-prepared mix, complied with the following requirements:
 - i. flexural stiffness $\geq 14,500$ MPa
 - ii. fatigue resistance ≥ 160 $\mu\epsilon$ at 1 million cycles, and
 - iii. richness modulus ≥ 3.5 .

Where the above conditions are not met, laboratory-prepared mix must be used to assess the suitability of the mix design for re-registration.

The production mix sample used for this testing must be representative of the target mix gradation and binder content for the nominated design. All test results for the production mix must be from one trial batch and be not more than 3 months old at the time of submission.

7 Registration of non-standard and nonconforming mix designs

7.1 General

Asphalt mix designs that do not fully conform with the requirements of Transport and Main Roads specifications, may be registered as a non-standard or nonconforming mix design at the discretion of the Asphalt Mix Design Registrar. However, the Asphalt Mix Design Registrar may require additional testing to be carried out to ensure any safety, environment and performance concerns are adequately addressed prior to registration and use on Transport and Main Roads projects.

Mix design registration does not guarantee acceptance of a non-standard or nonconforming mix design for use on a particular project and its suitability will need to be determined by the Transport and Main Roads Project Manager in consultation with the Asphalt Mix Design Registrar.

As part of the mix design registration process, the Asphalt Mix Design Registrar typically provides guidance to Transport and Main Roads Project Managers about the size and/or scope of demonstration projects that use a particular mix design. This guidance is usually included on the asphalt mix design register.

Transport and Main Roads Project Managers need to consider a range of factors, including guidance provided by the Asphalt Mix Design Registrar, when determining whether a particular non-standard or nonconforming mix design is suitable for use on their project (as well as any restrictions or conditions that may apply). **Hold Point 3** in MRTS30 *Asphalt Pavements* provides the mechanism for Administrators to consider accepting the use of a non-standard or nonconforming asphalt mix design on a specific project.

The asphalt mix design certificate for non-standard and nonconforming mix designs must clearly detail all departures from the requirements of the relevant specifications.

Appendix A – Asphalt mix design code designations

The following tables contain descriptions of abbreviations to be used in a mix design code.

Table A1 – Mix design code designations

Mix Designation	Description
Part 1	
AC#M ¹	Medium duty dense graded asphalt mix, as defined in MRTS30 <i>Asphalt Pavements</i> , ranging in nominal aggregate size from 7 mm to 20 mm.
AC#H ¹	Heavy duty dense graded asphalt mix, as defined in MRTS30 <i>Asphalt Pavements</i> , ranging in nominal aggregate size from 7 mm to 20 mm.
OG# ¹	Either 10 mm or 14 mm open graded asphalt mix, as defined in MRTS30 <i>Asphalt Pavements</i> .
SMA# ¹	Either 10 mm or 14 mm stone mastic asphalt mix, as defined in MRTS30 <i>Asphalt Pavements</i> .
EME2	14 mm EME2 asphalt mix, as defined in MRTS32 <i>High Modulus Asphalt (EME2)</i> .
Part 3	
G	Indicates the mix contains recycled glass aggregate. The percentage in the mix must also be identified, for example (10G) for 10% recycled glass aggregate.
R	Indicates the mix contains RAP. The percentage of RAP in the mix must also be identified for example, (15R) for 15% RAP.
W	Indicates the mix contains a wax-based warm mix asphalt additive.
F	Indicates the mix contains a water-based warm mix asphalt additive or is produced as warm mix asphalt using water-based binder foaming.
S	Indicates the mix contains a surfactant-based warm mix asphalt additive.
A	Indicates the mix contains a bitumen adhesion agent, apart from hydrated lime.
M1000	Indicates the mix contains M1000 Multigrade bitumen binder complying with AS 2008.
15/25 Pen	Indicates the mix contains 15/25 penetration grade bitumen complying with MRTS32 <i>High Modulus Asphalt (EME2)</i> .
10/20 Pen	Indicates the mix contains 10/20 penetration grade bitumen complying with MRTS32 <i>High Modulus Asphalt (EME2)</i> .
C600 (C320+ 30R)	Indicates that the mix contains C320 bitumen and 30% RAP to produce a binder blend with a viscosity equivalent to C600 bitumen binder.
C	Indicates that the mix contains a polymer modified binder that includes crumb rubber.

Notes

¹ # is to be replaced by the relevant nominal aggregate size.

Table A2 – Asphalt manufacturer abbreviations

Manufacturer	Abbreviation
Allens Asphalt Pty Ltd	AL
Austek Asphalt Services Pty Ltd	AU
Boral Resources (Qld)	B
Brisbane City Council	BCC
Colas Queensland Pty Ltd	C
Downer EDI Works Pty Ltd	D
Fulton Hogan Industries Pty Ltd	FH
Pioneer North Queensland Pty Ltd	PNQ
RPQ Mackay Pty Ltd	R
Suncoast Asphalt Pty Ltd	SCA
Sunstate Asphalt Pty Ltd	SA
Trico Asphalt Pty Ltd	RPQ

Appendix B – Asphalt mix design certificate example

ASPHALT MIX DESIGN CERTIFICATE

Supplier: Manufacturer **Manufacturing Plant:** Cooroy(M020911)
Mix Design Code: MAN: AC10M/15/1234(15R)(F) **Binder Type:** 320,A15E
Technical Specification: MRTS30 **Expiry Date:** 01/07/18

Mix Component	Source	Proportion (%)
10 mm Aggregate	Moy Pocket Quarry	30
7 mm Aggregate	Moy Pocket Quarry	20
Crusher Dust	Narangba Quarry (Hornfels)	20
Fine Sand	Metalia Sands (Maryborough)	13
RAP (< 10 mm)	Manufacturer (Cooroy)	15
Hydrated Lime	Sibelco (Tamaree/Attunga)	2
Class 320 Bitumen	Puma (Pinkenba)/SAMI (Port of Brisbane)	4.6
A15E Polymer Modified Binder	Puma (Pinkenba)/SAMI (Pinkenba)	
Water	Astec Double Barrel Green system	2*

* Expressed as a percentage of the binder

Laboratory compaction method	Marshall (50 blows per face)
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Mix Property	Mix Design	Job Limits	Mix Property	Mix Design	Job Limits
% passing			% passing		
26.5 mm			2.36 mm	42	37-47
19.0 mm			1.18 mm	28	23-33
13.2 mm	100	100	0.600 mm	23	19-27
9.50 mm	91	84-98	0.300 mm	14	10-18
6.70 mm	75	68-82	0.150 mm	8	5.5-10.5
4.75 mm	65	58-72	0.075 mm	5	3.5-6.5
Binder Content (%)	5.10	4.80-5.40	Maximum Density (t/m³)	2.480	2.445 ⁺ -2.515 ⁺

+ Assumed value

I certify this mix design complies with the requirements of MRTS30 *Asphalt Pavements*.

John Citizen
Technical Manager

Date

The Technical Specification version and the registration status of this mix can be found via the Asphalt Mix Design Register located on the TMR website.

Appendix C – Asphalt mix design certificate, high RAP content example

ASPHALT MIX DESIGN CERTIFICATE

Supplier: **Manufacturer** **Manufacturing Plant:** Cooroy(M020911)
Mix Design Code: MAN: AC20H/20/1234(30R) **Binder Type:** C600 (C320 + 30R)
Technical Specification: MRTS30 **Expiry Date:** 01/07/21

Mix Component	Source	Proportion (%)
20 mm Aggregate	Moy Pocket Quarry	20
10 mm Aggregate	Moy Pocket Quarry	20
7 mm Aggregate	Moy Pocket Quarry	10
Crusher Dust	Narangba Quarry (Hornfels)	8
Fine Sand	Metalia Sands (Maryborough)	10
RAP (< 14 mm)	Manufacturer (Cooroy)	15
RAP (< 10 mm)	Manufacturer (Cooroy)	15
Hydrated Lime	Sibelco (Tamaree/Attunga)	2
Class 320 Bitumen	Puma (Pinkenba)/SAMI (Port of Brisbane)	4.0

* Expressed as a percentage of the binder

Laboratory compaction method and temperature	Marshall (50 blows per face) 155°C ± 3°C
Method of Managing Binder Blend Viscosity	Method 1

Mix Property	Mix Design	Job Limits	Mix Property	Mix Design	Job Limits
% passing			% passing		
26.5 mm	100	100	2.36 mm	35	30-40
19.0 mm	98	91-100	1.18 mm	25	20-30
13.2 mm	85	78-92	0.600 mm	18	12-24
9.50 mm	72	65-79	0.300 mm	13	9-17
6.70 mm	60	53-67	0.150 mm	8	5.5-10.5
4.75 mm	47	40-54	0.075 mm	5	3.5-6.5
Binder Content (%)	4.80	4.50-5.10	Maximum Density (t/m ³)	2.500	2.465*-2.535*

+ Assumed value

I certify this mix design complies with the requirements of MRTS30 *Asphalt Pavements*.

John Citizen
Technical Manager

Date

The Technical Specification version and the registration status of this mix can be found via the Asphalt Mix Design Register located on the TMR website.

