

COMPARISON OF TMR, RMS AND STANDARD ASPHALT TEST METHODS

Variance between test methods

Minimal

Low

Medium

High

TMR test	RMS test	Std. test	Parameter	Test Method Differences
Q301	T661	AS 2891.1.1	Sample Preparation	<p>The quartering procedure described in Section 4.2 of Q301 is virtually the same as that prescribed in AS2891.1.1 and RMS test method T661. However, RMS test method T661 differs from Q301 and AS 2891.1.1 as follows:</p> <ul style="list-style-type: none"> • T661 requires the sample to be mixed for up to 3 minutes in the laboratory while AS 2891.1.1 permits sampling of premixed asphalt from a truck or from paver augers or from stockpiles and during discharge from a plant. Q301 only permits hand sampling of premixed asphalt from a truck or trailer. • T661 specifies that DGA mixes containing either C320 or AR450 binder must be mixed and conditioned for 60±10 min at 150 ± 5°C while AS 2891.1.1 and Q301 do not require either. • T661 specifies that DGA mixes that contain either C600 or multigrade 1000/320 binder must be mixed and conditioned for 60±10 min at 155 ± 5°C while AS 2891.1.1 and Q301 do not require either. • T661 specifies that DGA mixes that contain polymer modified binder must be mixed and conditioned for 60±10 min at 160 ± 5°C while AS 2891.1.1 and Q301 do not require either. • T661 specifies that OGA mixes that contain polymer modified binder must be mixed and conditioned for 60±10 min at 135 ± 5°C while AS 2891.1.1 and Q301 do not require either. • Q301 permits cooled samples to be reheated in an oven set to about 150°C while AS2891.1.1 permits cooled samples to be reheated in an oven set to a temperature not greater than 160°C.

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Q304B ¹	T655 ²	-	Mix Permeability	<p>T655 is based on Q304A and differs from Q304B as follows:</p> <ul style="list-style-type: none"> T655 does not specify how <u>the</u> test specimen is to be prepared, whereas, Q304B specifies that: <ul style="list-style-type: none"> The mix shall be heated to $150 \pm 3^{\circ}\text{C}$ in an oven for 60 ± 10 minutes before being compacted Test specimens shall be compacted using a gyratory compactor in accordance with AS 2891.2.2 DG14 specimens shall have a height of $50 \pm 2\text{mm}$ DG20 specimens shall have a height of $65 \pm 2\text{mm}$ DG28 specimens shall have a height of $90 \pm 2\text{mm}$ 9 specimens to be prepared – three of which must have a relative compaction of $91 \pm 1\%$, three must have a relative compaction of $95 \pm 1\%$ and three must have a relative compaction of $91 \pm 1\%$ T655 only reports <u>the</u> permeability of <u>one</u> test specimen, whereas, Q304B reports the linear regression relationship between log permeability and air voids for the design mix. <p>Both methods determine the permeability of test specimens in accordance with Test Method Q304A.</p>

¹ This test only has to be performed on DG14, DG20 and DG28 mix designs which have any point on the grading curve that falls on or within the grading envelope limits stated in MRTS30, Table 10.3.4.2

² RMS specifications R116, R119, R121 and R123 do not require this test to be performed as RMS assumes that the permeability of conforming mixes will be acceptable

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Q305	T604 ³	AS 2891.5	Mix Stability, Flow & Stiffness	<p>T604 conforms to AS 2891.5. The main differences between Q305 and AS 2891.5/T604 are:</p> <ul style="list-style-type: none"> Q305 test specimens are required to be prepared from representative samples of mix blended in accordance with Q309 whereas AS 2891.5 test specimens are required to be prepared from representative samples of mix blended obtained in accordance with AS2891.2.1. Both test methods require mixes up to 20 mm nominal size to be compacted into an 89mm high mould with an internal diameter of 101.6mm using a 4.53kg hammer with a free fall of 457mm at a rate of 60 to 70 blows per minute. However, only Q305 permits mixes up to 28mm nominal size to be compacted into an 89mm high mould with an internal diameter of 150mm using a 9.92 kg hammer with a free fall of 460mm. Q305 does not specify that the mix shall be spaded into the mould prior to being transferred into the oven. Whereas, AS2891.5 requires the mix to be vigorously spaded 25 times prior to being warmed in the oven. Q305 specifies that mix shall be warmed for 60 ± 10 minutes⁴ in an oven to the temperatures prior to being compacted. Whereas, AS 2891.5 does not specify a duration that the mix must be warmed. AS 2891.5 specifies that mixes containing C170 and C320 binder shall be warmed to the same temperatures specified in Q305 Table 3. However, AS 2891.5 specifies that mixes containing modified binders should be compacted at the temperature that produces a binder viscosity of 0.27 ±0.03 Pa.s while Q305 specifies that: <ul style="list-style-type: none"> Mixes containing C600 and M1000/320 Multigrade binder shall be compacted at 155 ±3°C Polymer modified DGA mixes shall be heated to and compacted at 160 ±3°C Polymer modified OGA mixes shall be heated to and compacted at 140 ±3°C
Q306A	T606	AS 2891.9.1	Bulk density	All three test methods determine the bulk density of compacted asphalt by weighing waxed asphalt specimens immersed in water and in air. However, T606 requires the water bath temperature to be 25±1°C while AS 2891.9.1 and Q306A both permit the water bath to have a range of temperatures.

³ This test is not specified in RMS specifications R116, R119, R121 and R123 as RMS assumes that the stability, flow and stiffness of conforming mixes will be acceptable

⁴ This is same duration as the mix conditioning time specified in AS2891.2.1 Clause 5(i)

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Q306B	-	AS 2891.9.2	Bulk density	The only differences between Q306B and AS 2891.9.2 are the water density values used. Both methods require compacted asphalt specimens to be weighed in the air and when saturated in air and in water.
Q306C	-	-	Bulk density	Q306C is the test method preferred by TMR for determining bulk density as it permits the sample to be tested for other properties upon removal of the silicone sealant. It is applicable to asphalt samples of all asphalt types either compacted in the laboratory or cut from the pavement.
Q306D	-	AS 2891.9.3	Bulk Density	Q306D is identical to AS 2891.9.3: Determination of bulk density of compacted asphalt – Mensuration method.
Q306E	AS 2891.14.2	AS 2891.14.2	Bulk density	Q306E was developed by TMR and evolved through internal Departmental research investigations. It determines the wet density of asphalt by averaging the density count for the asphalt over a 1 minute period in two orientations using backscatter model and adding the difference between the average core compacted density and the average standard blocks wet density for all accepted test sites. AS 2891.14.2 determines the density of thin layers of asphalt using a nuclear thin-layer density gauge with two backscatter modes of operation or geometries to mathematically eliminate the influence of the underlying layer(s) and is applicable to asphalt layers between 25 mm and 100 mm thick and to asphalts having a nominal maximum size not greater than 40 mm.
Q307A	-	AS 2891.7.1	Maximum mix density	Q307A and AS 2891.7.1 both determine maximum density of asphalt by displacement of water. Q307A differs from AS 2891.7.1 only in the test temperature used and the procedure adopted for determining the sample volume.
Q307B	T605	AS2891.7.3	Maximum mix density	Q307B is the presumed test method for determining maximum density of asphalt using the Methylated Spirit Displacement method based on AS2891.7.3 which is identical to T605.
Q308A	T607	AS 2891.3.1	Grading & binder content	All three test methods determine binder content using the refluxing method and determine the particle size distribution of the aggregate by sieve analysis. Only T607 reports the filler to binder ratio.
Q308D	-	AG:PT/T234	Grading & binder content	Q308D is based on AG:PT/T234. Both tests involve igniting the binder fraction of the mix to determine binder content and determining the grading of the burnt residue by sieve analysis. Both tests require the binder content to be calibrated against a reference test. However, AG:PT/T234 requires the calibration tests to be calibrated against the nominal binder content of the mix. While Q308D requires calibration against Q308A.

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Q309 ⁵	T661	AS2891.2.1	Mix Preparation (constituent mixing and conditioning)	<p>The main differences between these test methods are:</p> <ul style="list-style-type: none"> Q309 requires aggregates larger than 0.075 mm to be thoroughly washed⁶. T661 and AS2891.2.1 do not. Q309 requires the temperature of the aggregates and filler to be up to 50°C hotter than the binder at the point of mixing⁷. T661 and AS2891.2.1 specify the binder and mixing temperatures must be the same⁸. T661 require mixes containing C600, multigrade binder and polymer modified binder to be mixed at a slightly (5 to 10°C) higher temperatures than AS2891.2.1. Q309 requires the binder temperature to be up to 10°C hotter than AS2891.2.1 or T661. AS2891.2.1 and T661 require mixes to be conditioned in an oven for 60 ±10 min. Q309 does not. Q309 requires the mix to be compacted. AS2891.2.1 and T661 do not require the mix to be compacted.
Q310	T648	AG:PT/T235	Binder drainage (when held at normal handling temperature for an hour ⁹)	<p>The main difference between these methods is the temperature of the mix during the test:</p> <ul style="list-style-type: none"> Q310 requires mixes containing bitumen binders and polymer modified binders to be tested at 150°C and 175°C respectively¹⁰. AG:PT/T235 requires OGA mixes containing bitumen binders and polymer modified binders to be tested at 160°C and 170°C respectively and SMA mixes containing bitumen binders and polymer modified binders to be heated to be tested at 75°C and 185°C respectively. T648 requires the mix to be tested at 170°C ± 2°C.

⁵ Section J2.4.1 of Main Roads' System for Registration of Approved Asphalt Suppliers specifies that suppliers shall either submit mix prepared in accordance with Q309 or samples of each constituent.

⁶ MRTS30, Clause 10.2 specifies that particles ≥ 0.075 mm shall be clean, hard, durable, and free from clay and other aggregations of fine material, soil, organic matter and any other deleterious material

⁷ Q309, Clause 9.3 acknowledges that "some breakdown of the aggregates in the mix may occur during the mixing process" (as a result of the high mixing temperatures and/or weak aggregate particles?)

⁸ R116 Cl. 2.4.5 specifies that binder and aggregate temperature difference ≤ 30°C at the point of mixing and that the temperature of asphalt must not at any time in the process exceed 175°C.

⁹ MRTS30, Cl. 12.2.1.1 permits storage of OGA for up to 4 hours but does not specify a permissible storage temperature range.

¹⁰ MRTS30, Cl. 12.2.2.3 specifies that the temperature of loaded OGA shall not exceed 150°C for mixes with bitumen binders, and 175°C for mixes with polymer modified binders

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Q311	T606 (Appendix A)	AS 2891.8	Voids in compacted mix (% air voids, VFB and VMA)	<p>The differences between Q311, T606 and AS 2891.8 are as follows:</p> <ul style="list-style-type: none"> Q311 assumes binder absorption = water absorption (as determined in accordance with Q211) while AS 2891.8 calculates binder absorption based on the maximum density of mix and the respective bulk densities and proportions of the combined mineral aggregate fractions. T606 ignores binder absorption. Q311 requires the maximum density of the sample to be determined in accordance with Q307A while AS2891.8 requires it to be determined in accordance with AS 2891.7.1. Q311 requires its maximum density to be determined in accordance with Q307A while AS2891.8 requires it to be determined in accordance with AS 2891.7.1. T606 requires the maximum density of the mix to be determined in accordance with T605. T606 specifies that the bulk density of the core must be determined by waxing the core then weighing it in the air and in water. Q311 requires the bulk density of the sample to be determined in accordance with Q306A, Q306B or Q306C while AS2891.8 requires it to be determined in accordance with AS 2891.7.3. Q311 requires the binder content of the sample to be determined in accordance with Q308A or Q308D. AS 2891.8 requires it to be determined in accordance with AS 2891.3.1, AS 2891.3.2, or AS 2891.3.3. T606 does not require the binder content to be determined. Q311 requires the density of the binder in the sample to be determined in accordance with Q331 while AS 2891.8 requires the density of the binder to be determined in accordance with AS 2341.6 or AS 2341.7. T606 does not require the density of the binder to be determined. Q311 calculates and reports binder and void contents in % by volume while AS 2891.8 calculates and reports void contents in % by volume and binder contents and absorptions in % by mass. T606 does not calculate binder content and calculates air voids using a different formula to the other two methods. AS 2891.8 calculates the bulk density of combined mineral aggregates from the aggregate and filler proportions and densities whereas Q311 and T643 do not. AS2891.8 and Q311 both calculate VMA by adding the air voids volumetric content to the effective binder volumetric content. However, AS 2891.8 also provides a formula to calculate VMA from the core's bulk density, binder content and the bulk density of its combined mineral aggregates. AS 2891.8 calculates and reports the theoretical binder film index while Q311 does not. T606 specifies that the bulk density of the core must be determined by waxing the core then weighing it in the air and in water. Q311 requires the bulk density of the sample to be determined in accordance with Q306A, Q306B or Q306C while AS2891.8 requires it to be determined in accordance with AS 2891.7.3.

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Q313	-	AG:PT/T236	Abrasion loss	Both tests measure aggregate loss after 300 revolutions in the Los Angeles machine. The only significant difference in the test methods appears to be the method of manufacturing the test specimens. Q313 requires two specimens to be compacted using 50 blows per face in accordance with Q305 while AG:PT/T236 requires three samples to be manufactured in accordance with AS 2891.2.2 using a gyratory compactor.
Q314	-	AS2891.14.5	Relative Compaction	<p>Q314 calculates the ratio of the compacted density of the asphalt determined in accordance with Q306A, Q306B , Q306C, Q306D or Q306E to the maximum density of the asphalt as determined in accordance with test method Q307A. Whereas, AS2891.14.5 calculates the ratio of the compacted density of the asphalt determined in accordance with AS2891.9.1, AS2891.9.2, AS2891.9.3, AS2891.14.1.1, AS 2891.14.1.2 or AS2891.14.2 to the reference density which may be one of the following:</p> <ul style="list-style-type: none"> • The bulk density of compacted asphalt determined at the design bitumen content of the mix during the tests to develop the design mix. • The bulk density of compacted asphalt determined on representative samples obtained from the asphalt on which field density tests have been performed. • The maximum density of the asphalt determined at the design bitumen content of the mix during the tests to develop the design mix. • The mean maximum density of the asphalt determined from five separate samples

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Q315	T640	AG:PT/T232	Sensitivity of asphalt to water	<p>The three test methods differ as follows:</p> <ul style="list-style-type: none"> • All three methods specify different mix preparation methods: <ul style="list-style-type: none"> ➢ Q315 requires the mix to be prepared in accordance with Q309. ➢ AG:PT/T232 requires the asphalt to be mixed and conditioned in accordance with AS2891.2.1 or sampled in accordance AS2891 ➢ T640 requires the mix to be either sampled in accordance with T100 or batched in the laboratory and conditioned in an oven for 60 ± 5 min at $150 \pm 5^\circ\text{C}$. • Q315 requires the air void content of the briquettes to be determined in accordance with Q311 while AG:PT/T232 and T640 require briquette air void content to be determined in accordance with AS2891.8 • AG:PT-T232 and T640 specify that briquettes of mix containing aggregate particles larger than 20mm shall be $150\text{mm} \pm 2$ mm in diameter and $85 \text{ mm} \pm 1$ mm high. Q315 is not applicable to asphalt with a nominal size not larger than 20 mm.

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Q316	T643	AS2891.8	Binder Absorption of Asphalt Mix Components	<p>Q316 differs from AS2891.8 and T643 as follows:</p> <ul style="list-style-type: none"> Q316 requires the total binder content (B) and aggregate grading of the sample of asphalt mix to be determined in accordance with Q308A or Q308D while AS 2891.8 and T643 require it to be determined in accordance with AS 2891.3.1, AS 2891.3.2, or AS 2891.3.3 Q316 requires the maximum density of the sample of asphalt mix to be determined in accordance with Q307A while AS2891.8 requires it to be determined in accordance with AS 2341.6 or AS 2341.7 Q316 requires the density of the binder in the sample to be determined in accordance with Q331 while AS 2891.8 and T643 requires the density of the binder to be determined in accordance with AS 2341.7 (AS2891.8 also permits the binder density to be determined in accordance with AS 2341.6 or requires binder density to be determined in accordance with AS2341.7. Q316 requires the particle density of the aggregate fraction retained on the 4.75mm sieve to be determined in accordance with Q214B while AS2891.8 and T643 require the bulk density of the combined coarse aggregate components to be determined in accordance with AS 1141.6.1 or AS 1141.6.2 Q316 requires the particle density of the aggregate fraction passing the 4.75 mm sieve excluding added filler to be determined in accordance with Test Method Q214A while AS2891.8 requires the bulk density of the combined fine aggregate components excluding added filler to be determined in accordance with AS 1141.5.

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Q317	T643	AS 2891.8	Binder Film Thickness	<p>Q317 differs from AS2891.8 and T643 as follows:</p> <ul style="list-style-type: none"> Q317 is silent regarding how the mineral aggregate proportions are to be determined but specifies that the total binder content shall be determined in accordance with Test Methods Q308A or Q308D. T643 permits the mix proportions to be assumed from the mix design while AS2891.8 requires them to be determined in accordance with AS 2891.3.1, AS 2891.3.2 or AS 2891.3.3. Q317 requires the dry density of the coarse aggregate particles, ρ_c, to be determined in accordance with Q214B. While AS 2891.8 specifies AS1141.6.1 or AS1141.6.2 shall be used and T643 specifies AS1141.6.1. Q317 requires the dry density of the fine aggregate particles, ρ_f, to be determined in accordance with Q214A. While AS 2891.8 and T643 specify that AS1141.5 must be used to determine ρ_f. Q317 requires the density of the binder in the sample, ρ_b, to be determined in accordance with Q331 while AS 2891.8 requires ρ_b to be determined in accordance with AS 2341.6 or AS 2341.7. T643 specifies that ρ_b shall be determined in accordance with AS 2341.7 or from an AS2008 Clause A4compliant certificate. Q317 requires the maximum density of the mix, ρ_{max}, to be determined in accordance with Q307A while AS2891.8 requires ρ_{max} to be determined in accordance with AS 2891.7.1 and T643 requires ρ_{max} to be determined in accordance with T605. Q317 requires the binder absorption of the aggregate to be determined in accordance with Q211 or Q316 or using the formula in Clause 6.2. T643 and AS2891.8 require the proportion of the binder absorbed by the mineral aggregates is to be calculated from the binder content, combined aggregate density and ρ_{max}. AS 2891.8 also reports VMA, VFB and maximum theoretical density of the mix while Q317 and T643 do not.
Q318	-	-	Mix Volume Ratio	This method describes the procedure for calculation of the mix volume ratio for SM14 and SM10 stone mastic asphalt

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Q319	AG:PT/T220	AG:PT/T220	Compaction of asphalt slabs	<p>The significant differences between test methods Q319 and AG:PT/T220 are:</p> <ul style="list-style-type: none"> AG:PT/T220 requires binders to be mixed with the mineral aggregates at the following temperatures: <ul style="list-style-type: none"> Mixes containing conventional and multigrade binders $150 \pm 5^\circ\text{C}$ (c.f. $165 \pm 5^\circ\text{C}$, Q319) Mixes containing polymer binders $170 \pm 5^\circ\text{C}^{11}$ (c.f. $175 \pm 5^\circ\text{C}$, Q319) AG:PT/T220 requires the mineral fraction to have the same temperature as the binder at the point of mixing. Q319 requires the temperature of the mineral fraction of the mix at the point of mixing to be: <ul style="list-style-type: none"> 40°C above that of C170 binder 50°C above that of C320 and polymer modified binder 60°C above that of C600 and multigrade binder AG:PT/T220 requires the receiving tray and spreading device to be preheated to approximately 160°C prior to compacting the mix. Q319 requires the receiving tray and compaction foot to be preheated to the compaction temperature but does not specify the required compaction temperature of the mix. Q319 prescribes the number of vibrations and compaction foot pressure to be used to compact the mix. Whereas, AG:PT/T220 specifies that the mix shall be compacted using a device that will ensure that: <ul style="list-style-type: none"> the slabs have a particle distribution and orientation consistent with that of insitu pavement materials wheel tracker test specimens have a mean air voids value = the target air voids content $\pm 1\%$ the difference between maximum and minimum air voids of replicate wheel tracker specimens $\leq 1.5\%$ the percent passing the 75 μm sieve after compaction less that before compaction $\leq 2\%$. Q319 requires slab to be silicon sealed top and bottom then weighed in air and in water to determine its compacted density and its maximum density, binder content and air voids content to be determined in accordance with test methods Q307A, and Q311 respectively. While AG:PT/T220 requires the slab's bulk density, maximum density and air voids content to be determined in accordance with AS 2891.9.2, AS 2891.7.1 and AS 2891.8 respectively. Q319 only accepts slabs whose grading and binder contents vary from the target values by less than the maximum variations in Table 3. While AG:PT/T220 does reject slabs based on grading or binder content.

¹¹ This is the mixing temperature range for asphalts containing A15E binder recommended in APAA Advisory Note 7.

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Q320 ¹²	AG:PT/T231 ¹³	AG:PT/T231	Deformation resistance	<p>AG:PT/T231 specifies that all test specimen replicates¹⁴ shall:</p> <ul style="list-style-type: none"> Prepared in prepared in accordance with AST005-1999¹⁵. While Q320 specifies that the test specimens shall be manufactured in accordance with Q319). Stored in a cool (< 30°C) environment for between 4 and 30 days prior to testing. While Q231 specifies that specimens shall be between 7 and 14 days at the time of testing) Maintained at 60 ± 1°C throughout the testing process and for a maximum of 24 hours prior to being tested. While Q320 requires the test specimen to be conditioned at the testing temperature (normally 60°C) for at least 8 hrs. 50 ± 5 mm thick when manufactured in the laboratory from mix with a nominal size ≤ 14 mm or 75 ± 5 mm thick if constructed from DG20 mix or between 35 mm and 110 mm thick if cut from the pavement Be 300 mm wide and 300 mm in breadth or 200 mm in diameter Contain 5 ± 1.0 % air voids. Q320 requires the air voids to be within a certain range Receive 10,000 passes of a 700 ± 20 N wheel load or until a mean tracking depth of 15 mm is achieved. Q320 also requires 5,000 load cycles (= 10,000 load passes) or until a mean rut depth of 15mm is achieved.

¹² Q319 is only applicable to densely graded mixes that have a maximum particle size ≥ 10mm.

¹³ RMS only requires this test to be performed on heavy duty DGA mixes that conform to R116 when specified in Annexure R116/A.

¹⁴ AG:PT/T231 does not specify the number of replicates but does recommend a minimum of two. Q320 specifies three replicates.

¹⁵ AST 005 has not been reviewed as we have not been able to procure a copy of AST 005. We presume that test method AST 005 has been superseded by AG:PT/T220.

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Q321	-	-	Fixed and free binder	<p>Q321 determines:</p> <ul style="list-style-type: none"> the fixed binder content of mixes = the binder portion that is immobilised by the filler the fixed binder content of mixes = the binder portion that is neither absorbed by the aggregate nor immobilised by the filler <p>Q321 requires:</p> <ul style="list-style-type: none"> the total binder content of the sample (B) to be determined in accordance with Test Method Q308A or Q308D the binder absorption of the aggregate (b) to be determined in accordance with Test Methods Q211 or Q316 or using an established binder absorption/water absorption relationship the density of the binder in the sample (D_b) to be determined in accordance with Test Method Q331 the compacted density of the sample (D_c) to be determined in accordance with Test Method Q306A or Q306C the proportion of the combined filler (P_{fill}) to be determined as a percentage of the total aggregate and filler in the sample and record the value to the nearest 0.1 in accordance with Q318? the apparent particle density of the combined filler (ρ_{fill}) to be determined in accordance with Test Method AS 1141.7 the voids in dry compacted filler for the combined filler (V) to be determined to the nearest 1% in accordance with Test Method AS 1141.17 the effective binder volume to be calculated in accordance with the equation in Q321, Cl. 4.1 the fixed binder volume to be calculated in accordance with the equation in Q321, Cl. 4.2 the fixed binder fraction to be calculated in accordance with the equation in Q321, Cl. 4.3 the free binder volume to be calculated in accordance with the equation in Q321, Cl. 4.4

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Q322	T662	AS2891.2.2 ¹⁶	Gyratory compaction curve	<p>These three methods differ as follows:</p> <ul style="list-style-type: none"> T662 specifies that mix must be sampled and conditioned in accordance with RMS test method T661 while AS2891.2.2 specifies that the mix may be either sampled in accordance with AS 2891.1 and immediately transferred into an insulated container and stored for 30 ± 1 min or must be mixed in the laboratory and then preconditioned at the required temperature in accordance with AS 2891.2.1 for 60 ± 10 min. Q322 does not specify how the mix is to be manufactured or sampled. Q322 only permits mix with a nominal maximum particle size ≤ 20mm to be compacted in a 100mm diameter mould. While AS2891.2.2 and T662 both permit mix with a nominal maximum particle size ≤ 40mm to be placed in a 150mm diameter mould and compacted using the gyratory compactor. Q322 and T662 specify that the mix must be compacted using a set number of compaction cycles while AS2891.2.2 also allows the number of compaction cycles to be varied to compact the mix to a specific height. All three tests require the mix to be conditioned in an oven for 60 ± 10 min prior to being compacted. However, Q322 requires the mix to be conditioned and compacted at $150 \pm 3^\circ\text{C}$ while AS 2891.2.2 requires DGA mixes to be conditioned and compacted at $150^\circ \pm 5^\circ\text{C}$ and OGA mixes to be conditioned and compacted at $130^\circ \pm 5^\circ\text{C}$. T662 specifies the following range of conditioning and compaction temperatures: <ul style="list-style-type: none"> DGA mixes containing either C320, AR450, C600 or multigrade 1000/320 binder must be conditioned and compacted at $155 \pm 5^\circ\text{C}$. DGA mixes containing polymer modified binder must be conditioned and compacted at $160 \pm 5^\circ\text{C}$. OGA mixes that contain polymer modified binder must be conditioned and compacted at $135 \pm 5^\circ\text{C}$. WMA to be conditioned and compacted at the temperature specified by the manufacturer of the additive or used during the WMA manufacturing process.

¹⁶ Q304B specifies that this test shall be used to prepare permeability test specimens

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Q705		AG:PT/T250	Texture depth	Q705 is identical to AG:PT/T250 except that site selection may also be in accordance with Test Method Q050.
Q708A	-	-	Roughness	Q708A defines the procedure for measuring road roughness using a vehicle-mounted NAASRA Roughness Meter. Q708A has been the standard test method for measuring road roughness in Queensland for nearly 40 years.
Q708B	T187	AG:AM/T001	Roughness	<p>Q708B and AG:AM/T001 both define the procedure for measuring the IRI or NAASRA roughness counts of road pavements, determined from the direct measurement of the longitudinal profile of the road surface using a vehicle-mounted inertial laser based non-contact device. T187 prescribes the procedure for determining IRI or NAASRA roughness counts based on the quarter or half car model i.e. along one or both wheel tracks respectively. The primary differences between these test methods is in how each calculates NAASRA roughness from IRI:</p> <ul style="list-style-type: none"> AG:AM/T001 and T187 use the following quarter car relationship to calculate NAASRA roughness from IRI: $\text{NAASRA (counts/km)} = 26.49 \times \text{Wheelpath IRI} - 1.27$ Q708B and T187 use the following half car model relationship to calculate NAASRA roughness from IRI: $\text{NAASRA (counts/km)} = 33.67 \times \text{Lane IRI (m/km)} - 1.95$
Q708C			Roughness	Q708C defines a procedure for measuring IRI determined from direct measurement of the longitudinal profile in each wheel path using a static Level and Staff.
Q708D		AG:PT/T450	Roughness	Both test methods define the procedure for measuring the road roughness or surface evenness of road pavements determined from direct measurement of the longitudinal profile in each wheel path using the ARRB Walking Profiler. Q708D advises that the No. of NAASRA roughness counts per km = $33.67 \times \text{Lane IRI (m/km)} - 1.95$ while AG:PT/T450 advises that No. of NAASRA roughness counts per km = $26.5 \times \text{Wheelpath IRI (m/km)} - 1.27$.
Q712	T183		Three metre straight edge	Both tests define the procedure for measuring the deviation below a three metre long straight edge

COMPARISON OF TMR, RMS AND STANDARD ASPHALT TEST METHODS

Variance between test methods

Minimal

Low

Medium

High

TMR test	RMS test	Std. test	Parameter	Test Method Differences
AS 2891.11 ¹⁷	-	AS 2891.11	Degree of particle coating	AS 2891.11 sets out the method for determining the degree of particle coating of asphalt of nominal size 7 mm or greater, based on the percentage of coarse aggregate particles that are completely coated with binder.
AS 2891.13.1	AS 2891.13.1	AS 2891.13.1	Resilient modulus	In NSW, test method AS 2891.13.1 is only performed on densely graded asphalt mixes that contain more than 25% RAP material and/or warm mix asphalt additive or if specified in Annexure R116/A. MRST31 and MRTS30 specify that the indirect tensile resilient modulus of all heavy duty densely graded mixes with a nominal particle size greater than 7mm shall be determined in accordance with AS 2891.13.1 at 5% air voids.
AS 2891.12.1 ¹⁸	-	AS 2891.12.1	Dynamic creep	AS 2891.12.1 sets out the method for determining the accumulated axial deformation response of asphalt mixtures normally used in pavements. The SAI GLOBAL website advises that test method AS 2891.12.1 has been withdrawn.

¹⁷ This test is specified in MRTS31, Cl. 12.2.2.1 but it not specified in RMS specifications R116, R119, R121 or R123.

¹⁸ MRTS31 requires the dynamic creep of heavy duty DGA production and design mixes to be recorded but does not specify the acceptable range of values for dynamic creep.