

Australian/New Zealand Standard™

Methods of sampling and testing asphalt

Method 9.3: Determination of bulk density of compacted asphalt—Mensuration method

AS/NZS 2891.9.3:2014

PREFACE

This Standard was prepared by the Joint Standards/Standards New Zealand Committee CE-006, Asphalt and Sprayed Surfacing, to supersede AS 2891.9.3—2005. It is based on VicRoads (Roads Corporation trading as ‘VicRoads’) method CRB 202.03, *Bulk Density of Compacted Asphalt Specimens by Mensuration* (August 1976).

The objective of this Standard is to set out the method to determine the bulk density by measurement of the dimensions of compacted asphalt specimens.

The objective of this revision is to reflect current practice in performing the measurements and to permit vacuum drying.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

METHOD

1 SCOPE

This Standard sets out the method for determining the bulk density by measurement of compacted asphalt specimens. The method is particularly appropriate for use with open-graded mix or dense-graded mix with surface voids larger than 3 mm diameter.

NOTE: Determining the density of relatively thin samples (e.g. where the asphalt thickness is less than 2.5 times the asphalt nominal size) may result in more variable or unreliable results due to the small size and the increased influence of surface voids. In particular, this is applicable to larger sized mixes with large surface voids such as nominal size 14 mm asphalt or greater and or stone mastic asphalt.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1984	Vernier callipers (metric series)
2102	Micrometer callipers for external measurement
2891	Methods of sampling and testing asphalt
2891.1.2	Method 1.2 Sampling—Coring method
2891.1.3	Method 1.3 Sampling—Asphalt from slabs

AS/NZS

2891.1.1 Method 1.1: Sampling—Loose asphalt

2891.2.2 Method 2.2: Sample preparation—Compaction of asphalt test specimens using a gyratory compactor

2891.5 Method 5: Compaction of asphalt by Marshall method and determination of stability and flow—Marshall procedure

3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 2891.1.1 apply.

4 APPARATUS

The following apparatus is required:

- (a) *Calliper* An appropriate calliper meeting the requirements of AS 1984 or micrometer calliper meeting the requirements of AS 2102, readable to 0.1 mm.

NOTE: Good measuring practice would have the length of the jaw of the calliper greater than half the diameter of the sample to ensure the calliper fully measures the diameter in cross-section.

- (b) *Balance* A balance of sufficient capacity, with a limit of performance not exceeding ± 0.5 g.

5 TEST SAMPLE

Unless otherwise specified, the asphalt sample may be either compacted in the laboratory in accordance with AS/NZS 2891.2.2 or AS/NZS 2891.5, or removed from a pavement in accordance with AS 2891.1.2 or a slab in accordance with AS 2891.1.3. Any loose particles or foreign matter shall be removed from the sample before testing.

6 PROCEDURE

The procedure shall be as follows:

- (a) Carefully remove any lip formed around the edges of the sample.
- (b) For samples obtained from the field, dry to constant mass in air or under a vacuum (see Appendix A).

NOTE: Constant mass is reached when the difference between two successive determinations of mass of the asphalt sample, after a further drying period or a period under vacuum for not less than 1 h, differs by no more than 0.1% of the total mass of the sample.

- (c) Weigh the sample and record its dry mass (m_1)
- (d) Measure the height of the sample at eight evenly distributed points around the perimeter of the sample and record all measurements.
- (e) Measure the diameter or length of all sides of the sample at four evenly distributed points around the perimeter and record all measurements.

7 CALCULATIONS

Calculate the following:

- (a) The volume of sample (V), in cubic cm, from the following equation:

$$V = h \times \pi \frac{d^2}{4} \times 10^{-3} \quad \dots 7(1)$$

where

h = average of test sample height measurements, in mm

d = average of test sample diameter measurements, in mm

- (b) Bulk density of sample (ρ_{bulk}), in t/m³, from the following equation:

$$\rho_{\text{bulk}} = \frac{m_1}{V} \quad \dots 7(2)$$

where

m_1 = mass in air of the dry sample, in g

V = volume of the sample, in cm³

8 TEST REPORT

The following shall be reported:

- (a) The bulk density to the nearest 0.001 t/m³.
 (b) Reference to this Standard (i.e. AS/NZS 2891.9.3).