

Australian/New Zealand Standard™

AS/NZS 2891.9.2:2014

Methods of sampling and testing asphalt

Method 9.2: Determination of bulk density of compacted asphalt—Presaturation method

PREFACE

This Standard was prepared by the Joint Standards/Standards New Zealand Committee CE-006, Asphalt and Sprayed Surfacing, to supersede AS 2891.9.2—2005. It is based on VicRoads (Roads Corporation trading as ‘VicRoads’) method RC 202.02, *Bulk Density of Compacted Asphalt—Presaturation Method*.

The objective of this Standard is to determine the bulk density of compacted asphalt using a presaturation procedure.

The objective of this revision is to limit the application of this method to relatively non-absorptive asphalts and to permit vacuum drying of specimens.

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 of compacted asphalt using a presaturation procedure. The test method is applicable only to dense graded asphalt having a water absorption by volume no more than 2.0% or stone mastic asphalt having a water absorption by volume no more than 1.0%, as calculated in Clause 7.1.

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/NZS

2891	Methods of sampling and testing asphalt
2891.1.1	Method 1.1: Sampling—Loose asphalt
2891.1.2	Method 1.2: Sampling—Coring method
2891.1.3	Method 1.3: Sampling—Asphalt from slabs
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) *Balance* Balance of sufficient capacity, with a limit of performance not exceeding ± 0.5 g, and equipped with a means for weighting beneath the balance.
- (b) *Suspension device* Nylon loop or wire frame to suspend the asphalt sample.
- (c) *Water container* Filled with water and fitted with an overflow device, and of sufficient capacity to contain the suspended asphalt sample while maintaining a constant water level.
- (d) *Suspension bridge* To support the balance and suspension device over the water container.
- (e) *Thermometer* A thermometer or other suitable temperature-measuring device covering a range of 0°C to 40°C , readable and accurate to 1°C or less.
- (f) *Timer* A suitable timing device.

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/NZS 2891.1.2 or a slab in accordance with AS/NZS 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) Dry to constant mass in air or under 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.
- (b) Weigh the sample and record its dry mass (m_1).
- (c) Immerse the sample in the water container for at least 5 min.
- (d) Position the water container directly beneath the balance and attached suspension device, and zero the balance.
- (e) Transfer the sample to the suspension device so that the sample remains completely immersed. Remove any air bubbles adhering to the sample and weigh. Record the mass (m_2).
- (f) Remove the sample from the suspension device and surface-dry the specimen by blotting quickly with a damp towel.
NOTE: In blotting the surface, a damp cloth towel (not paper) should be used. The towel should be soaked and wrung between samples. The aim of blotting is to remove excess water beaded on the surface and is not meant to draw water from the void spaces of the sample. The desired action is to quickly and lightly blot the excess water from the sample, and determine the saturated surface dry mass as quickly as possible.
- (g) Weigh the wet sample and record the mass (m_3).
- (h) Record the temperature of the water in the water container to the nearest 1°C .

7 CALCULATIONS

Calculate the following:

- (a) The water absorption by volume, as a percentage, from the following equation:

$$WA = 100 (m_3 - m_1) / (m_3 - m_2) \quad \dots 7(1)$$

where

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

WA = water absorption by volume of asphalt specimen, as a percentage

m_3 = mass in air of the saturated sample, in g

m_2 = mass in water of the saturated sample, in g

- (b) The bulk density of sample (ρ_{bulk}), in t/m^3 , from the following equation:

$$\rho_{\text{bulk}} = \frac{m_1 \rho_w}{m_3 - m_2} \quad \dots 7(2)$$

where

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

ρ_w = density of water at the test temperature, in t/m^3 (from Table 1)

m_3 = mass in air of the saturated sample, in g

m_2 = mass in water of the saturated sample, in g

8 TEST REPORT

The following shall be reported:

- (a) The bulk density to the nearest 0.001 t/m^3 .
- (b) Water absorption by volume to the nearest 0.1% .
- (c) Reference to this Standard (i.e. AS/NZS 2891.9.2).