

Australian/New Zealand Standard™

AS/NZS 2891.7.3:2014

Methods of sampling and testing asphalt

Method 7.3: Determination of maximum density of asphalt—Methylated spirits displacement

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CE-006, Asphalt and Sprayed Surfacing, to supersede AS 2891.7.3—2005.

METHOD

1 SCOPE

This Standard sets out the method for determining the maximum density of asphalt. It measures the density of the voidless asphalt by displacement of methylated spirits.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1141 Methods for sampling and testing aggregates

1141.2 Method 2: Basic testing equipment

AS/NZS

2891 Methods of sampling and testing asphalt

2891.1.1 Method 1.1: Sampling—Loose asphalt

3 SAFETY PRECAUTIONS

As methylated spirits is a flammable liquid, care shall be taken to ensure that the test is performed well away from a naked flame or sparking electrical equipment.

4 DEFINITIONS

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

5 MATERIALS

The following materials are required:

- (a) *Methylated spirits* Commercial grade.
- (b) Potable water.
- (c) *Paper towels or other suitable drying material.*

6 APPARATUS

The following apparatus is required:

- (a) *Flasks* Calibrated flat bottomed and fitted with a flat metal cover plate with a capillary tube extending down into the flask for removing excess fluid to a constant depth by suction. The capacity of the flask shall be as follows:
 - (i) 1 L for asphalt of 20 mm nominal size or less.
 - (ii) 2 L for asphalt greater than 20 mm nominal size.
- (b) *Suction pump* Of low pressure such as a water operated device.
- (c) *Water bath* Thermostatically controlled at a temperature of $25 \pm 1^\circ\text{C}$ and of sufficient capacity to allow the flask and its contents to be immersed up to its neck.
- (d) *Balance* Not less than 5 kg capacity, with a limit of performance not greater than ± 0.5 g.
- (e) *Drying oven* To heat asphalt so that it can be prepared satisfactorily. Temperatures should not exceed 150°C .
- (f) *Hotplate* Having an adjustable temperature control and provided with a cover to diffuse heat evenly.
- (g) *Thermometer* A thermometer or other suitable temperature-measuring device covering a range of 0 – 40°C , readable and accurate to 1°C or less.

7 TEST SAMPLE

Unless otherwise specified, obtain a sample of asphalt in accordance with AS/NZS 2891.1.1 and prepare the sample as follows:

- (a) Reduce the test sample by quartering in accordance with AS/NZS 2891.1.1 to obtain two test portions complying with Table 1.
- (b) Loosen the material by hand, whilst the test portion is warm to a condition where it can be separated into the smallest particles practicable without causing rupture of the binder coating.

TABLE 1
MINIMUM MASS OF TEST PORTION

Nominal size of mix mm	Minimum mass of test portion g
≤ 10	500
14	750
20	1000
> 20	2000

8 PROCEDURE

8.1 Density of methylated spirits

The density of the methylated spirits at 25°C shall be determined to the nearest 0.001 t/m^3 using the flask as follows:

- (a) Weigh the flask and record the mass (m_1).
- (b) Fill the flask with water and immerse it up to the neck in the water bath for 1 h, or until a constant temperature of 25°C is obtained. If necessary, weight the flask to keep it firmly immersed.

- (c) Remove the flask to a level bench, carefully seat the capillary tube device on the flask and remove the excess of the water by means of the suction pump.
- (d) Remove the capillary tube device. Then immediately and carefully dry the outside of the flask with paper towels.
- (e) Weigh the flask and contents and record the mass (m_2).
- (f) Determine the volume of the flask (refer Clause 9).
- (g) Empty and dry the flask.
- (h) Fill the flask with methylated spirits and immerse it up to the neck in the water bath for 1 h, or until a constant temperature of 25°C is obtained. If necessary, weight the flask to keep it firmly immersed.
- (i) Remove the flask to a level bench, carefully seat the capillary tube device on the flask and remove the excess of the methylated spirits by means of the suction pump.
- (j) Remove the capillary tube device. Then immediately and carefully dry the outside of the flask with paper towels.
- (k) Weigh the flask and contents and record the mass (m_3).

NOTE: Determining the volume of the flask and the density of the methylated spirits at 25°C is only required for new flasks and for new batches of methylated spirits.

8.2 Maximum density of asphalt

The procedure shall be carried out for each test portion as follows:

- (a) Using a calibrated, dry flask, place the test portion in the flask, weigh and record the mass (m_4).
- (b) Add sufficient methylated spirits to cover the test portion by about 25 mm. Carefully heat the flask on the hotplate until the methylated spirits is boiling freely but is not distilling out of the flask.
- (c) Carefully agitate the flask and contents until all occluded air in the sample has been displaced.
- (d) Remove the flask from the hotplate and allow it to cool in air for a few minutes and then in water.
- (e) Fill the flask with methylated spirits and immerse it up to the neck in the water bath for 1 h, or until a constant temperature of 25°C is obtained. If necessary, weight the flask to keep it firmly immersed.
- (f) Remove the flask to a level bench, carefully seat the capillary tube device on the flask and remove the excess of the methylated spirits by means of the suction pump.
- (g) Remove the capillary tube device. Then immediately and carefully dry the outside of the flask with paper towels.
- (h) Weigh the flask and contents and record the mass (m_5).

NOTE: During the boiling process there is a tendency for some samples to coagulate, particularly if the bitumen content is high. To extract such samples from the flask at the end of the tests, the bulk of the methylated spirits should be poured out and the residue heated sufficiently to facilitate its removal.