

Australian/New Zealand Standard™

AS/NZS 2891.3.1:2013

Methods of sampling and testing asphalt

Method 3.1: Binder content and aggregate grading—Reflux method

PREFACE

This Standard was prepared by the Joint Standards/Standards New Zealand Committee CE-006, Asphalt and Sprayed Surfacing, to supersede AS/NZS 2891.3.1:1997, *Methods of sampling and testing asphalt, Part 3.1: Bitumen content and aggregate grading—Reflux method*.

METHOD

1 SCOPE

The Standard sets out the method for determining, by hot solvent extraction, the binder content of mixes containing a bituminous binder and subsequently the particle size distribution of aggregate by sieve analysis.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- 1141 Methods for sampling and testing aggregates
- 1141.11.1 Method 11.1: Particle size distribution—Sieving method
- 1152 Specification for test sieves
- 1681 Safety requirements for electrically heated Type 1 ovens in which flammable volatiles can occur
- 3568 Oils for reducing the viscosity of residual bitumen for pavements

AS/NZS

- 2243 Safety in laboratories
- 2243.8 Part 8: Fume cupboards
- 2891 Methods of sampling and testing asphalt
- 2891.1.1 Method 1.1: Sampling—Loose asphalt

Safe Work Australia

Exposure standards for atmospheric contaminants in the occupational environment

3 DEFINITIONS

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

4 SAFETY PRECAUTIONS

Extreme care shall be taken in the use of solvents. All operations which involve the use of solvents shall be carried out in a fume cupboard complying with AS/NZS 2243.8. The values as given in the Safe Work Australia Standard, *Exposure standards for atmospheric contaminants in the occupational environment*, shall be observed.

5 MATERIALS

5.1 Solvent

A solvent that is totally miscible with bitumen and will remove all of the bituminous binder from the aggregate including permeable voids within the aggregate particles. The solvent shall not leave a residue on the aggregate.

NOTE: All solvents should meet occupational, health and safety requirements (see Clause 4).

5.2 Cutter oil

In accordance with AS 3568.

6 APPARATUS

6.1 Asphalt heating oven

Thermostatically controlled to operate at a temperature of at least 105°C and not greater than the temperature to which the aggregate was heated during the mixing of the asphalt, with mechanical ventilation exhausting to a fume cupboard duct or outside atmosphere. The oven shall have low temperature sheathed elements and, where flammable solvents are used, shall be fitted with a blow-out panel and locking door complying with AS 1681.

6.2 Balances

Balances readable to at least—

- (a) 0.1 g with a limit of performance not exceeding 0.5 g; and
- (b) 1.0 mg with a limit of performance not exceeding 10 mg.

6.3 Centrifuge

To accommodate tubes of suitable capacity [see Clause 8.1(g)].

6.4 Containers

Flat bottomed, having a capacity of at least 60 mL and fitted with press-over lids.

NOTE: Aluminium containers should not be used with certain solvents as it causes accelerated oxidation of the aluminium.

6.5 Dish

A shallow metal dish.

6.6 Flask

2 L Erlenmeyer or round-bottom type, provided with a reflux condenser and additional stopper for sealing the flask during weighing.

6.7 Fume cupboard

In accordance with the appropriate requirements specified in AS/NZS 2243.8.

6.8 Heating device

A hotplate or heating mantle with adjustable temperature control. Where used, the hotplate shall be covered with a mat of appropriate material to diffuse the heat evenly.

6.9 Sieves

Complying with AS 1152.

6.10 Tongs

Laboratory.

6.11 Wash bottle

Suitable for containing solvent.

7 SAMPLE PREPARATION

The test sample shall be prepared as follows:

- If necessary, warm the test sample just sufficiently by heating, preferably in an oven, to loosen the mass of material.
- Reduce the size of the test sample by cone and quartering to obtain a test portion of minimum mass given in Table 1.
- Where the test sample may contain moisture or volatile oils dry the test portion to constant mass at a temperature of at least 105°C.

NOTE: It is not necessary to dry the test portion where the test sample is known to contain a low moisture content such as samples of hot or warm mixed asphalt taken when the asphalt was warm or hot and where the test sample has been protected from contamination by water or volatile oils after sampling.

TABLE 1
MINIMUM MASS OF TEST PORTION

Nominal size of mix mm	Minimum mass of test portion g
<10	600
10	800
14	800
20	1000
>20	1200

8 METHOD FOR DETERMINING BINDER CONTENT

8.1 Procedure

The procedure shall be as follows:

- Weigh the flask with the stopper, and record the mass (m_1) to the nearest 0.1 g.
- Transfer the test portion to the flask and replace stopper. Weigh and record the mass (m_2) to the nearest 0.1 g.
- Add sufficient solvent to the flask to cover the test portion by about 25 mm. Place the flask on the heating device. Fit the reflux condenser to the flask.
- Warm the flask and contents to dissolve the binder, adjusting the temperature of the heating device as necessary. Swirl the contents of the flask at times during the heating to make sure none of the binder is baked on the bottom of the flask.

NOTE: For mixes containing slag or other absorptive type aggregates, it may be necessary to heat the mixture for longer periods in order to extract all traces of absorbed or occluded binder.

- Cool the flask to room temperature with the condenser still in position.