

AS 2341.26:2020



STANDARDS
Australia



Methods of testing bitumen and related roadmaking products

Method 26: Determination of sieve residue



AS 2341.26:2020

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- Australian Asphalt Pavement Association
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- Australian Institute of Petroleum
- Australian Road Research Board
- Austroads
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Preface

This Standard was prepared by the Australian Members of Joint Standards Australia/Standards New Zealand Committee CH-025, Bitumen and Related Products (for Roadmaking) to supersede AS/NZS 2341.26—2002.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this document as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this document is to quantify the presence of coarse binder particles in a bituminous emulsion by measuring the mass of the particles retained on a specified sieve.

The major changes in this edition are as follows:

- (a) The recommended diameters for the 150 μm and 710 μm sieves used in the document have been made the same.
- (b) The amount of emulsion required to be passed through the 710 μm sieve has been reduced from approximately 2 L to approximately 200 g.
- (c) The scope of the document has been increased to include conventional bituminous emulsions, high binder content bituminous emulsions and polymer modified bituminous emulsions.

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NOTES

Australian Standard®

Methods of testing bitumen and related roadmaking products

Method 26: Determination of sieve residue

1 Scope

This document sets out a method for determining the quantity of coarse particles in a bituminous emulsion sample that is retained on a specified sieve. It is applicable for use with conventional bituminous emulsions, high binder content bituminous emulsions and polymer modified bituminous emulsions that have sieve residue results of less than or equal to 1 %.

WARNING — THE USE OF THIS STANDARD MAY INVOLVE HAZARDOUS MATERIALS, OPERATIONS AND EQUIPMENT. THIS STANDARD DOES NOT PURPORT TO ADDRESS ALL OF THE SAFETY ISSUES ASSOCIATED WITH ITS USE. IT IS THE RESPONSIBILITY OF THE USER OF THIS STANDARD TO ESTABLISH APPROPRIATE SAFETY AND HEALTH PRACTICES, AND TO DETERMINE THE APPLICABILITY OF REGULATORY LIMITATIONS PRIOR TO USE.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS/NZS 2341.1, *Methods of testing bitumen and related roadmaking products, Part 1: Precision data — Definitions*

AS/NZS 2341.21, *Methods of testing bitumen and related roadmaking products, Method 21: Sample preparation*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

3 Terms and definitions

For the purposes of this document, the terms and definitions in AS/NZS 2341.1 and the following apply.

3.1

bituminous binder

binder predominantly comprised of bitumen

3.2

bituminous emulsion

dispersion of one liquid within another where the dispersed phase is usually a bituminous binder and the continuous phase is usually water

3.2.1

anionic bituminous emulsion

type of bituminous emulsion in which the bituminous binder particles are negatively charged

3.2.2

cationic bituminous emulsion

type of bituminous emulsion in which the bituminous binder particles are positively charged

3.2.3

conventional bituminous emulsion

bituminous emulsion in which the percentage by mass of the bituminous binder in the emulsion is of the order of 60 % or below

3.2.4**high binder content bituminous emulsion**

bituminous emulsion in which the percentage by mass of the bituminous binder in the emulsion is significantly greater than 60 %

3.2.5**polymer modified bituminous emulsion**

bituminous emulsion which contains a synthetic polymer or natural latex

Note 1 to entry: These can be produced either by emulsifying a previously manufactured polymer modified binder, or adding emulsified latex to the bituminous emulsion during emulsion manufacture.

3.3**may**

indicates the existence of an option

3.4**shall**

indicates that a statement is mandatory

3.5**should**

indicates a recommendation

4 Principle

A bituminous emulsion is strained through a weighed sieve to quantify the presence of coarse binder particles that may indicate adverse storage, handling or application effects.

5 Apparatus

The following apparatus is required:

- (a) *Balance* — A balance of at least 200 g capacity, readable to 0.001 g, with a limit of performance not exceeding 0.003 g.
- (b) *Sieve* — A sieve, conforming with ISO 3310-1, fitted with a wire mesh having an aperture of either 150 µm or 710 µm. The frame of the sieve should be about 100 mm diameter and 40 mm deep.

NOTE 1 A 710 µm sieve should be used if a high binder content bituminous emulsion or a polymer modified bituminous emulsion is tested.

- (c) *Sieve tray* — Watch glass, or circular metal dish with raised edges, with a diameter larger than the diameter of the sieve used in the test. The sieve tray should be of sufficient size so that the sieve can be placed stably on the sieve tray. The sieve tray should also be of suitable size so that it can be placed on the balance and weighed.
- (d) *Container* — Glass conical flask or beaker, or a plastic disposable cup, of suitable size to weigh the bituminous emulsion sample prior to passing it through the sieve.
- (e) *Surfactant solution* — An aqueous solution of surfactant compatible with the emulsion.

NOTE 2 If available from the supplier, the surfactant solution that was used to produce the emulsion should be used in the test. If such a solution is not available, then an aqueous solution containing 1 % w/w of cetrimide (a mixture of alkyltrimethylammonium bromides) in 0.1 mol/L HCl has been found to be suitable for testing cationic bituminous emulsions. An aqueous solution containing a suitable anionic surfactant has been found to be suitable for testing anionic bituminous emulsions.

- (f) *Plastic wash bottle* — A wash bottle to store the surfactant solution.

- (g) *Glass beaker* — A beaker with an internal diameter large enough to allow the sieve to be inserted securely into the top of the beaker.
- (h) *Thermostatically controlled oven* — A thermostatically controlled oven with ventilation, capable of maintaining a temperature within the range 105 °C to 110 °C.

6 Preparation of sample

Samples shall be obtained and prepared for testing in accordance with AS/NZS 2341.21. The sample shall be cooled to room temperature before testing.

7 Procedure

Either the 150 µm or the 710 µm sieve may be used for the test, depending on specified requirements.

The procedures for the 150 µm sieve and 710 µm sieve are as follows:

- (a) Place the sieve on the sieve tray and dry in the oven at 105 °C to 110 °C. Once dried, remove from the oven and allow to cool to room temperature. When cooled, place the sieve together with sieve tray on the balance. Weigh the sieve together with the sieve tray to the nearest 0.001 g (m_1).
- (b) Rinse the container with the appropriate surfactant solution using the wash bottle. Place the container on the balance and tare the balance to zero. If the 150 µm sieve is being used, pour approximately 100 g of emulsion sample into the container. If the 710 µm sieve is being used, pour approximately 200 g of emulsion sample into the container. Record the mass of emulsion sample added to the container to the nearest 0.001 g (m_2).

NOTE 1 Caution is required when performing the test to ensure that the sample does not include a surface skin which has formed due to bituminous emulsion cooling. If a surface skin is present on the sample due to cooling, this should be removed prior to pouring the bituminous emulsion sample into the container.

NOTE 2 High binder content bituminous emulsions may be too viscous to readily pass through the sieve and may need to be diluted with up to 50 % w/w surfactant solution to reduce emulsion viscosity and facilitate rapid flow through the sieve. If the bituminous emulsion is diluted prior to adding to the container, then the mass of sample added to the container should be adjusted to account for the dilution of the emulsion sample. The value of m_2 should correspond to the mass of the undiluted emulsion sample.

- (c) Place the sieve over the glass beaker and rinse it with the surfactant solution using the wash bottle. Pour the emulsion rapidly through the sieve. Rinse the container using the surfactant solution in the wash bottle to remove any remaining emulsion in the container. Pour the rinsings from the container through the sieve.
- (d) Rinse the sieve and its contents with the surfactant solution from the wash bottle until no liquid bituminous emulsion remains on the sieve. After all of the liquid bituminous emulsion has passed through the sieve, rinse the sieve with water to remove any remaining surfactant solution. Examine the sieve for any retained material.
- (e) Place the sieve on the sieve tray and dry the sieve, sieve tray and residue in the oven at 105 °C to 110 °C for 1 h. Remove the sieve, sieve tray and residue from the oven and allow to cool to room temperature. Weigh the sieve together with the sieve tray and residue to the nearest 0.001 g (m_3).

8 Calculation

Calculate the residue on the sieve as a percentage by mass of the emulsion as follows:

$$\text{Sieve residue, percentage by mass} = \frac{(m_3 - m_1)}{(m_2)} \times 100$$

where

m_1 = mass of sieve and sieve tray (g)

m_2 = mass of undiluted emulsion sample added to the container (g)

m_3 = mass of sieve, sieve tray and residue (g)

9 Report

The test report shall contain the following:

- (a) Test sieve size, 710 µm or 150 µm.
- (b) Residue on the test sieve to the nearest 0.01 % for results ≤ 1 %. If the test result exceeds 1 %, report "> 1 %".
- (c) Whether the sample was diluted with the surfactant solution, or undiluted in order to conduct the test.
- (d) Reference to this document, i.e. AS 2341.26.

10 Precision

The following criteria should be used for judging the acceptability of test results (95 % probability) for sieve residue results ≤ 0.2 % (refer to AS/NZS 2341.1):

- (a) *Repeatability* — Duplicate results by the same operator should not be considered suspect unless they differ by more than 0.03 %.
- (b) *Reproducibility* — The results submitted by each of two laboratories should not be considered suspect unless they differ by more than 0.08 %.

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