AS 2008—2013

AS 2008—2013

Australian Standard®

Bitumen for pavements



This Australian Standard® was prepared by Committee CH-025, Bitumen and Related Products (for Roadmaking). It was approved on behalf of the Council of Standards Australia on 18 October 2013.

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The following are represented on Committee CH-025:

* ARRB Group (Australian Road Research Board)
* Australian Asphalt Pavement Association
* Australian Chamber of Commerce and Industry
* Australian Institute of Petroleum
* AUSTROADS
* Engineers Australia
* National Association of Testing Authorities Australia
* Roading New Zealand
* Transit New Zealand

This Standard was issued in draft form for comment as DR AS 2008.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Australian Standard®

Bitumen for pavements

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# PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CH-025 Bitumen and Related Products (for Roadmaking), to supersede AS 2008—1997, *Residual bitumen for pavements*.

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

This Standard is one of a series relating to material for roadmaking purposes. Other Standards in the series are as follows:

AS

|  |  |
| --- | --- |
| 1160 | Bitumen emulsions for construction and maintenance of pavements |
| 2157 | Cutback bitumen |
| 3568 | Oils for reducing the viscosity of residual bitumen for pavements |

The main changes in this edition of the Standard are the following:

1. Removal of the Class 50 bitumen grade.
2. Inclusion of two new standard bitumen grades [Class 240 (C240), and Class 450 (C450)].
3. Inclusion of two multigrade bitumen grades [Multigrade 500 (M500) and Multigrade 1000 (M1000)].

These modifications reflect changes in the types of bitumen grades used for roadmaking purposes in Australia.

Bitumen grades are predominately specified in terms of their viscosities at 60°C and 135°C and penetration results at 25°C. These parameters are included in the Standard to ensure that bitumens show appropriate viscosity-temperature behaviour for effective use in the construction and maintenance of pavements. Test properties are also determined after bitumen samples have been subjected to the Rolling Thin Film Oven (RTFO) treatment to indicate the bitumen properties that may be expected when bitumens are incorporated into asphalt pavement mixes.

This edition also allows the use of ASTM D2872, *Standard Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)*, for RTFO treatment of bitumen samples and ASTM D92, *Standard Test method for Flash and Fire Points* by *Cleveland Open Cup Tester*, for measurement of bitumen flashpoint.

Statements expressed in mandatory terms in notes to tables are deemed to be requirements of this Standard.

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# STANDARDS AUSTRALIA

Australian Standard Bitumen for pavements

S E C T I O N 1 S C O P E A N D G E N E R A L

* 1. SCOPE

This Standard specifies requirements for bitumen intended for use in the construction and maintenance of pavements.

* 1. REFERENCED DOCUMENTS

The following documents are referred to in this Standard: AS

|  |  |  |
| --- | --- | --- |
| 2341 Methods of testing bitumen and related roadmaking products | | |
| 2341.2 | Method 2: | Determination of dynamic viscosity by vacuum capillary |
| 2341.3 | Method 3: | viscometer  Determination of kinematic viscosity by flow through a capillary |
| 2341.4 | Method 4: | tube  Determination of dynamic viscosity by rotational viscometer |
| 2341.7 | Method 7: | Determination of density using a density bottle |
| 2341.8 | Method 8: | Determination of matter insoluble in toluene |
| 2341.12 | Method 12: | Determination of penetration |
| 2341.14 | Method 14: | Determination of flashpoint of bitumen |
| AS/NZS |  |  |
| 2341 Methods of testing bitumen and related roadmaking products | | |
| 2341.5 | Method 5: | Determination of apparent viscosity by ‘Shell’ sliding plate |
| 2341.10 | Method 10: | micro-viscometer  Determination of the effect of heat and air on a moving film of |
| 2341.13 | Method 13: | bitumen (rolling thin film oven (RTFO) test)  Long-term exposure to heat and air |
| 2341.20 | Method 20: | Determination of sieve residue for bituminous materials |
| ASTM |  |  |

D92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester D2872 Standard Test Method for Effect of Heat and Air on a Moving Film of Asphalt

(Rolling Thin-Film Oven Test)

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* 1. DEFINITION

For the purpose of this Standard, the definition below applies.

1.3.1 Bitumen

Bituminous materials obtained by processing the material obtained from the refining of naturally occurring crude petroleum.

* 1. SAFETY DISCLAIMER

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

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# S E C T I O N 2 C L A S S I F I C A T I O N A N D P R O P E R T I E S

* 1. CLASSIFICATION

Bitumen is classified on the basis of its flow characteristics (rheology) expressed in terms of dynamic viscosity at 60°C, as shown in Table 2.1. Class 170, Class 240, Class 320, Class 450 and Class 600 bitumen can be considered to show standard viscosity-temperature behaviour. Multigrade 500 and Multigrade 1000 are specialized bitumen grades with a viscosity that varies less with temperature than the standard bitumen grades. The numerical parts of the grade designations shown in Table 2.1 represent indicative viscosity at 60°C values for each of the bitumen grades prior to rolling thin film oven (RTFO) treatment.

The bitumen grades are specified in terms of their properties determined either before or after treatment in the RTFO. This method of specification is intended to reflect the use of bitumen in different roadmaking applications.

TABLE 2.1

CLASSIFICATION OF BITUMEN FOR PAVEMENTS

|  |  |  |  |
| --- | --- | --- | --- |
| Formal grade designation | Informal designation | ·  Primary specified property—  Viscosity at 60°C Pa s | |
| Pre-RTFO treatment | Post-RTFO treatment |
| Class 170 | C170 | 140 to 200 | — |
| Class 240 | C240 | 190 to 280 | — |
| Class 320 | C320 | 260 to 380 | — |
| Class 450 | C450 | — | 750 to 1150 |
| Class 600 | C600 | 500 to 700 | — |
| Multigrade 500 | M500 | 400 to 600 | — |
| Multigrade 1000 | M1000 | — | 3500 to 6500 |

NOTE: Post-RTFO treatment values shown in Table 2.1 correspond to those specified when RTFO treatments are performed using AS/NZS 2341.10.

* 1. PROPERTIES

When determined in accordance with the methods specified in Table 2.2, the properties of the bitumen shall comply with the requirements stated therein for the class specified.

* 1. HOMOGENEITY AND FREEDOM FROM IMPURITIES

Bitumen shall be homogeneous and shall contain no inorganic mineral matter other than that naturally present.

* 1. FOAMING

Bitumen shall not foam when heated to a temperature of 175°C. The formation of a thin layer of bubbles shall not be regarded as foaming.

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* 1. SAMPLING

Bitumen shall be sampled so as to obtain a representative sample.

The sample size should be typically 1 L unless otherwise specified by the purchaser.

CAUTION: SAMPLES TAKEN FROM BITUMEN SPRAYERS MAY CONTAIN ADDITIVES SUCH AS SOLVENT OR ADHESION AGENTS, OR BOTH, AND TEST PROPERTIES MAY NOT BE REPRESENTATIVE OF THE BITUMEN USED.

NOTE: The following sampling precautions should be observed:

* + 1. Care should be taken to prevent contamination of the samples with solvents, cleaning fluids or different types of bituminous materials.
    2. Between sampling and testing, the sample should not be transferred from one container to another if this involves reheating of the sample after cooling.
    3. The sample container should be covered immediately after the sample is placed in it, and tightly and positively sealed when appropriately cooled.
    4. The sample container should not be submerged in solvent, nor should it be wiped with a solvent-saturated cloth. Any spilled materials on the outside of the container should be wiped with a clean, dry cloth immediately after the container is sealed.
  1. LABELLING

Samples shall be firmly packed for transport to the testing laboratory and shall be clearly identified by markings on the body of the container.

The following information shall be shown on the container or label:

1. Classification.
2. Batch or lot number
3. Date of sampling.
4. Supplier.
5. Place of sampling.
6. Quantity of material represented by sample where known.
7. Type and identifying number of container or vehicle from which the sample was taken.
8. Name of the sampler.

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TABLE 2.2

PROPERTIES OF BITUMEN AND MULTIGRADE BITUMEN FOR PAVEMENTS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Property | Requirement | | | | | | | | | | | | | | Method of test |
| C170 | | C240 | | C320 | | C450 | | C600 | | M500 | | M1000 | |
| Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
|  | 140 | 200 | 190 | 280 | 260 | 380 | Report | | 500 | 700 | 400 | 600 | Report | | AS 2341.2 or other agreed method (Note 1) |
|  | 0.25 | 0.45 | 0.32 | 0.55 | 0.40 | 0.65 | — | 0.70 | 0.60 | 0.85 | — | 1.0 | — | 1.5 | AS 2341.2 or AS 2341.3 or AS 2341.4 or other agreed method |
| Penetration at 25°C (100 g, 5 s),  [0.1 mm] | 62 | — | 53 | — | 40 | — | Report | | 20 | — | 65 | — | Report | | AS 2341.12 |
| Flashpoint, °C | 250 | — | 250 | — | 250 | — | 250 | — | 250 | — | 250 | — | 250 | — | AS 2341.14 or ASTM D92 |
| Matter insoluble in toluene, percent mass | — | 1.0 | — | 1.0 | — | 1.0 | — | 1.0 | — | 1.0 | — | 1.0 | — | 1.0 | AS 2341.8 or AS/NZS 2341.20 |
| Viscosity at 60°C, percentage of original after RTFO treatment  (Note 2) | — | 300 | — | 300 | — | 300 | — | — | — | 300 | — | — | — | — | AS/NZS 2341.10 and either AS 2341.2 or other agreed method |
| — | 340 | — | 340 | — | 340 | — | — | — | 340 | — | — | — | — | ASTM D2872 and either AS 2341.2 or other agreed method |
| ·  Viscosity at 60°C after RTFO  treatment, Pa s (Note 2) | — | — | — | — | — | — | 750 | 1150 | — | — | Report | | 3500 | 6500 | AS/NZS 2341.10 and either AS 2341.2 or other agreed method (Note 1) |
| — | — | — | — | — | — | 850 | 1300 | — | — | Report | | 4000 | 7400 | ASTM D2872 and either AS 2341.2 or other agreed method (Note 1) |
| Penetration at 25°C after RTFO treatment (100 g, 5 s), [0.1 mm] | — | — | — | — | — | — | 26 | — | — | — | Report | | 26 | — | Either AS/NZS 2341.10 or ASTM D2872 and AS 2341.12 |
| Long-term effect of heat and air, days | Report on request | | | | | | — | — | — | — | — | — | — | — | AS/NZS 2341.13 and either AS/NZS 2341.5 or other agreed method |
| 3  Density at 15°C, kg/m | Report on request | | | | | | | | | | | | | | AS 2341.7 |
| Mass change, percent mass | — | — | — | — | — | — | –0.6 | +0.6 | — | — | –0.6 | +0.6 | –0.6 | +0.6 | AS/NZS 2341.10 or ASTM D2872 |

Viscosity at 60°C, Pa·s Viscosity at 135°C, Pa s

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NOTES:

1. Viscosity at 60°C tests on M500 and M1000 shall be performed using AS 2341.2 and Asphalt Institute vacuum capillary viscometers.
2. Alternative RTFO treatment methods may be used (i.e. AS/NZS 2341.10 or ASTM D 2872) for which different property limits are specified.

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