

# Australian Standard<sup>®</sup>

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## Methods of testing bitumen and related roadmaking products

### Method 16: Determination of flashpoint of cutback bitumen

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#### PREFACE

This Standard was prepared by the Standards Australia Committee CH/25 on Bitumen and Related Products for Roadmaking to supersede AS 2341.16—1980.

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#### METHOD

**1 SCOPE** This Standard sets out a procedure for the determination of the closed flashpoint of cutback bitumens when the flashpoint does not exceed 110°C.

NOTE: The results obtained do not differ significantly from the minimum flashpoint of the material determined under equilibrium conditions of temperature and vapour pressure.

**2 REFERENCED DOCUMENTS** The following documents are referred to in this Standard:

AS

2106 Methods for the determination of the flashpoint of flammable liquids (closed cup)

2341 Methods of testing bitumen and related roadmaking products

2341.1 Part 1: Precisions data—Definitions

IP Methods for analysis and testing, Part 1, Vol. 2, Appendix A

**3 PRINCIPLE** The sample is placed in the cup of an Abel flashpoint apparatus and heated at a very slow uniform rate while stirring. A small test flame is directed into the cup at regular intervals, and the flashpoint is taken as the lowest temperature at which application of the flame causes the vapour above the sample to ignite.

**4 APPARATUS** The following items of apparatus are required:

- (a) *Abel flashpoint apparatus*—with a stirrer (as specified in AS 2106), but provided with means for mechanical stirring. Provision shall also be made for maintaining a good circulation in the waterbath, e.g. by means of a gentle stream of air, the air being introduced through a fine tube entering the bath through a hole bored for this purpose.
- (b) *Thermometers*—IP 43C (10°C to 110°C) or IP 44C (15°C to 121°C), as specified in IP Standard thermometers.
- (c) *Metronome*—set at 75 to 80 beats/min, or a pendulum of 600 mm effective length.
- (d) *Barometer*—reading to 1 mmHg (1 mmHg = 0.133 kPa).

**5 PREPARATION OF SAMPLE** In view of the ease with which volatile matter can be lost from some cutback bitumens, take all possible precautions against excessive handling of the sample to minimize its exposure to the atmosphere. Warm the sample, if necessary, while still sealed in its original container by standing the container in warm or hot water. Shake or stir thoroughly and transfer immediately to the test apparatus. Do not heat more than is absolutely necessary, preferably not higher than 15°C below the expected flashpoint of the sample.

**6 PROCEDURE** The procedure shall be as follows:

- (a) Thoroughly clean and dry all parts of the cup and its accessories. Remove all traces of solvent used to clean the apparatus.
- (b) Fill the water bath and annular space between the sample cup and the water bath completely with water, or with glycerol if it is expected that the flashpoint will be near or above 100°C.
- (c) With the oil cup in position, heat the apparatus to a temperature which is substantially the same as that of the preheated sample.
- (d) Fill the oil cup with the sample to the level indicated by the point of the gauge, put the cover in place and fit the thermometer.
- (e) Start the stirrer and regulate its speed to 70 r/min to 80 r/min with a downward thrust. If this speed cannot be attained with very viscous material at the start of heating, increase it as soon as the sample is warm enough.
- (f) Light the test flame and adjust it to a bead approximately 4 mm in diameter. Apply heat to the water bath so that the rate of temperature increase of the sample in the cup is not less than 0.4°C per minute nor more than 0.7°C per minute. To maintain this rate, it is recommended that the temperature of the water bath be kept approximately 4°C above the temperature of the material under test.
- (g) At each 1°C rise in temperature, apply the test flame without stopping the stirrer. Make the first application at about 10°C below the expected flashpoint.  
Draw the slide slowly open while the metronome beats three times and close the slide during the fourth beat. A pendulum, 600 mm in length, may be used in place of the metronome, counting beats from one extremity of the swing to the other.
- (h) Continue in this manner until the application of the test flame causes a distinct flash in the interior of the cup. Do not confuse the actual flash with the bluish halo that sometimes surrounds the test flame. Record the temperature indicated by the cup thermometer (the observed flashpoint (*C*)), and the barometric pressure (*H*) to the nearest millimetre.

**7 CALCULATION** Correct the observed flashpoint by the following equation:

$$\text{Corrected flashpoint} = C + 0.033 (760 - H)$$

where

*C* = observed flashpoint, in °C

*H* = barometric pressure, in mmHg

NOTE: Where the observed barometric pressure is in other units, the corrections may be made by the following equations:

$$\text{Corrected flashpoint} = C + 0.025 (1013 - M)$$

or

$$\text{Corrected flashpoint} = C + 0.25 (101.3 - P)$$

where

*M* = barometric pressure, in mbar

*P* = barometric pressure, in kPa

**8 PRECISION** The following criteria shall be used for judging the acceptability of test results with 95% probability (see AS 2341.1):

- (a) *Repeatability* Duplicate tests obtained by the same operator using the same apparatus should not be considered suspect unless they differ by more than 2°C.
- (b) *Reproducibility* Single test results obtained from two laboratories should not be considered suspect unless they differ by more than 4°C.

**9 TEST REPORT** The test report shall contain the following:

- (a) The corrected flashpoint to the nearest 0.5°C as 'flashpoint (closed)'.
- (b) Reference to this Australian Standard, i.e. AS 2341.16.

This Australian Standard was prepared by Committee CH/25, Bitumen and Related Products for Roadmaking. It was approved on behalf of the Council of Standards Australia on 11 April 1994 and published on 14 June 1994.

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