

Australian Standard™

AS 2341.25

Methods of testing bitumen and related roadmaking products

Method 25: Determination of consistency

1 SCOPE

This Standard sets out a method for determining the consistency of bitumen emulsion at 25°C (see Note, Clause 3) using the Engler viscometer.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1152 Specification for test sieves

AS/NZS

2341 Methods of testing bitumen and related roadmaking products

2341.1 Part 1: Precision data—Definitions

ASTM

E 1 Specification for ASTM thermometers

IP

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

3 PRINCIPLE

The efflux time of an emulsion at 25°C from an Engler viscometer is compared with that for water at the same temperature and from the same instrument. The ratio of the times obtained is expressed as degrees Engler.

NOTE: For high viscosity emulsions, a temperature higher than 25°C may be used.

4 APPARATUS

The following apparatus is required:

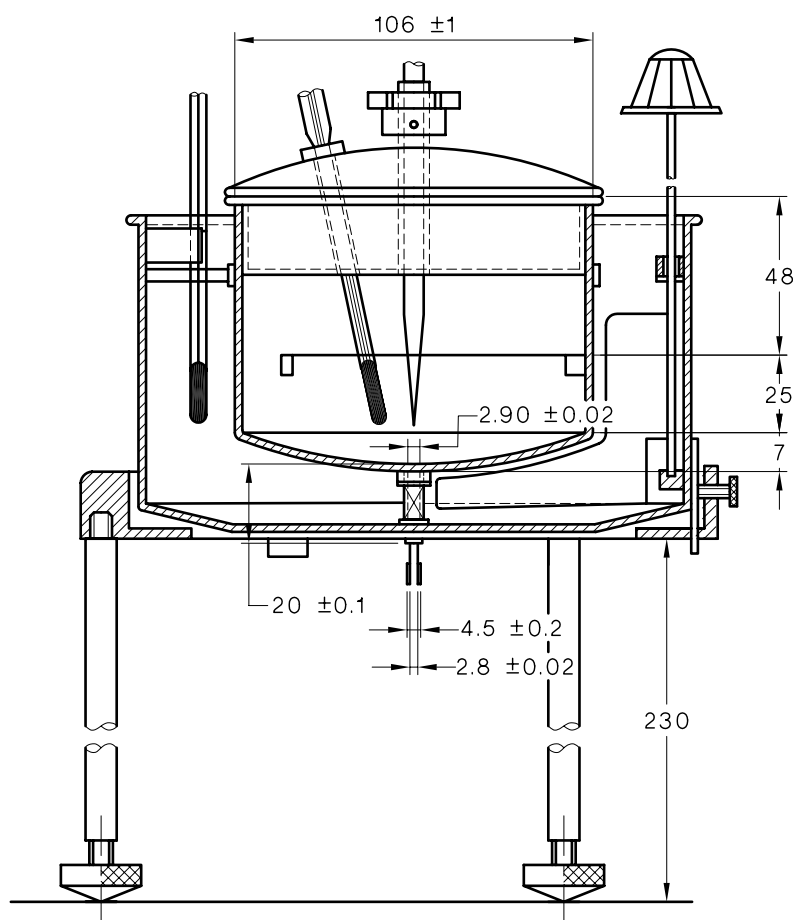
- (a) *Engler viscometer* Engler viscometer consisting of a cup with a short jet in the centre of the base, which is stoppered by means of a tapered, hardwood plug. The cup is surrounded by a waterbath fitted with a stirring device (see Figure 1).
- (b) *Sieve* A sieve having an aperture size of 600 µm complying with AS 1152.
- (c) *Timing device* A timing device of any suitable type, which can be read to 0.2 s or less, and is accurate to 0.07% when tested over 5 min.
- (d) *Two thermometers* Two thermometers complying with Specification IP 76C or two standard thermometers complying with No. 23C of ASTM E 1. For higher temperatures an appropriate thermometer shall be used (see Note, Clause 3).
- (e) *Volumetric receiving flask* A volumetric receiving flask of 200 mL capacity at 20°C.



5 VERIFICATION OF THE VISCOMETER

The procedure for verification of the viscometer shall be as follows:

- Wash the viscometer cup with a jet of xylene, then several times with alcohol and, finally, with distilled water.
- Set up and level the viscometer so that the measuring and levelling projections are in the same horizontal plane.
- Insert a stopper that has been used only for the water test of the apparatus and that has never been in contact with oil or emulsion.



DIMENSIONS IN MILLIMETRES

FIGURE 1 ENGLER VISCOMETER

- Fill the volumetric receiving flask nearly to the brim with distilled water at 20°C and pour into the viscometer cup. Allow the flask to drain in an inverted position for 3 min.
- Fill the cup to a little above the pointers.
- Place lid and thermometers in position and maintain temperature of water in the cup and bath at 20 ± 0.5°C.
- Raise stopper a few times to fill jet completely with water and wet surface of the outlet so that a drop completely covering the surface remains hanging.
- Set water surface exactly at the pointers by sucking out excess water with a pipette or, if necessary, by adding a small quantity of water at 20°C.

- (i) When water is completely at rest, place drained receiving flask underneath the orifice. Lift stopper right out vertically so that the surface of water suffers minimum disturbance. At the same time, start timer.
- (j) Note the time taken for receiving flask to fill to the 200 mL mark.
- (k) Repeat determination until three consecutive results have been obtained differing by no more than 0.5 s.
- (l) Clean apparatus and make another series of determinations in the same way. If agreement is obtained with the results of the first series, no further tests need be made; if not, carry out a further series of determinations until constant times of efflux are found.
- (m) The mean of the six values of the last two series is taken as the time of efflux of water and shall lie between the limits of 47 s and 53 s.

NOTE: If the time of efflux of water lies outside these limits, the orifice should be replaced or a viscometer that conforms to the required limits should be used. A verification procedure is required to be carried out at regular intervals.

6 DETERMINATION OF THE FACTOR FOR THE VISCOMETER

Repeat procedure described in Clause 5 at $25 \pm 0.2^\circ\text{C}$, calculate the mean of values obtained and record determination as the factor for the viscometer (T_w).

NOTE: For higher viscosity emulsions where the standard temperature other than 25°C is to be used, then the determination of the factor for the viscometer (T_w) should be carried out at that temperature.

7 PROCEDURE

The procedure shall be as follows:

- (a) Wash cup as described in Clause 5(a) and dry.
- (b) Adjust the temperature of water in the jacket of the viscometer to $25 \pm 0.2^\circ\text{C}$ and insert stopper in the cleaned cup.
- (c) Pour emulsion through the 600 μm sieve into the viscometer cup until the level of the surface makes contact with one or more of the pointers. Adjust levelling screws, if necessary. Add more emulsion until the surface of the emulsion makes contact with all three pointers, simultaneously.
- (d) Remove excess emulsion with a pipette; do not draw any off by raising the stopper because coagulation of bitumen may occur in the jet when stopper is reinserted.
- (e) When the temperature of jacket and emulsion is steady at $25 \pm 0.2^\circ\text{C}$, measure time of efflux of 200 mL of emulsion into receiving flask allowing emulsion to flow down the side of the flask to prevent frothing. Where frothing obscures the meniscus, the test shall be repeated from Step (a) above.
NOTE: Measurement should be carried out as soon as possible after filling the viscometer ensuring that the temperature of emulsion is maintained at $25 \pm 0.2^\circ\text{C}$.
- (f) Carry out three determinations on three separate portions of the sample and take the mean value (T_e). If any of the three determinations differ by more than 5% of the mean value, carry out three further determinations.
- (g) After each determination, wash out the cup with distilled water and remove superfluous water with filter paper. Clean jet with a folded piece of filter paper or pipe cleaner moistened with xylene and dry the base of the instrument around the jet with filter paper.