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Procedure for the Estimation of the Kerosene Content of Cutback Bitumen

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1 Scope

This document gives a procedure for calculating the kerosene content of cutback bitumen. The grade of bitumen used in the cutback, and the quantity of automotive gas oil and adhesion agent, if present in the cutback, is assumed.

This method applies to cutback bitumens manufactured from bitumen, Automotive Gas Oil (AGO) and kerosene complying with NZTA M01 specification, including up to 1.5pph of adhesion agent. Materials containing rheology modifiers, such as polymer modified bitumen, can not be analysed using this procedure.

2 Referenced Documents

(a) NZTA M01 Specification for Bitumen.
(b) AS 2341 Methods of Testing Bitumen and Related Road Making Products. Method 3: Determination of Kinematic Viscosity by Flow Through a Capillary Tube.
(c) ASTM D2170 Standard Test Method for the Kinematic Viscosity of Asphalts (Bitumens).
(d) ASTM D4402 Standard Test Method for Viscosity determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer.

3 Sampling

The following information shall be provided with each sample submitted for testing:

(a) The source of the cutback bitumen sample
(b) The name of the person taking the sample
(c) The sampling method used, if any.
(d) The grade of the bitumen used to manufacture the cutback
(e) The blended proportions of AGO, kerosene and adhesion agent in parts per hundred of the bitumen by volume at 15° C.
(f) The commercial name of the adhesion agent

4 Procedure

Determine the kinematic viscosity (V) of the test sample using the either AS 2341.3 or ASTM D2170.

Note: Alternative methods for determining the kinematic viscosity of the cutback bitumen sample may be used, for example ASTM D4402 provided the determined viscosity is corrected back to kinematic viscosity, or the equation in clause 5 is amended to use dynamic viscosity.

5 Calculation

Calculate the effective kerosene content as follows:

$$K = \frac{1}{(log\ (logV) +\ C_K)} \times\ (100 \times log\ (logB) - (log(logV) +\ C_D)\ \times\ (D + A) - 100 \times log\ (logV))$$

where:

V = the kinematic viscosity of the cutback bitumen at 60°C, in units of mm²/s.

K = the effective kerosene content in parts per hundred (pph) of the bitumen, by volume at 15°C

D = the AGO content in parts per hundred of the bitumen by volume at 15°C

A = the adhesion agent content in parts per hundred of the bitumen at 15° C, preferably by volume but mass values at typical dosage rates are sufficiently accurate.

B = the kinematic viscosity of the base bitumen in the cutback at 60°C

C_K and C_D are constants that depend on the crude oil from which the bitumen has been manufactured, the manufacturing process and the grade of the bitumen.

Note: see Table 1 for numerical values for the equation constants for legacy bitumens:

Table 1: Standard Constants

Bitumen Grade	C_K	C_D
180/200	0.42	0.19
130/150	0.42	0.19
80/100	0.42	0.19
60/70	0.42	0.19

Note: Where the bitumen is imported the importer should confirm the constants to be used.

6 Reporting

Report the following:

(a) All sample information as required by clause 3 above.
(b) The measured kinematic viscosity in mm^2/s at 60°C of the cutback sample.
(c) The estimated kerosene content K of the cutback to the nearest 0.1pph by volume.

7 Precision

Formal precision trials have not been carried out but the precision has been estimated based on the variation of bitumen viscosity and the precision of the viscosity test.

The precision of the method is therefore associated with the base viscosity and the precision of the viscosity test. When the results are based on one test on one sample then the estimated precision is 2pph of kerosene.