



Transport
Roads & Maritime
Services

Test method T515

Heptane xylene equivalent of bituminous material

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Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Safety Notes added-Reformatted and Revision Summary Added	D.Dash	Sep 1999
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T515 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T515

Heptane xylene equivalent of bituminous material

1. Scope

This test method sets out of the procedure for determining the heptane xylene equivalent of asphaltic bitumen. The procedure is derived from the American Association of State Highways Officials, Standard Designation T102-1957. The test is not applicable to natural asphalts or to bitumen from petroleum containing non-bituminous matter insoluble in xylene.

2. Safety Notes

A poster describing the action to be taken in the event of bitumen burns must be displayed in the laboratory in the vicinity of the bitumen pouring area(s).

Use either tongs or heat resisting gloves when handling hot bitumen. Loose or puncture lids before heating containers. Examine cold samples for signs of water. Remove all visible water. Wear spectacles when heating samples suspected of containing water. Cleaning solvents such as toluene may be toxic, handle such solvents in a fume cupboard, consult safety data sheet.

3. Apparatus and Materials

- (a) A thermostatically controlled oven with good air circulation capable of maintaining a temperature within the range of 100°C to 110°C.
- (b) A heating device, such as a hotplate.
- (c) A metal container of about one half litre capacity.
- (d) A flask of 50 mL capacity fitted with a cork stopper through which is inserted a 20 cm length of glass tubing 6 mm to 7 mm internal diameter.
- (e) Filter papers, Whatman's No. 50, 7 cm.
- (f) Pipettes of 10 mL capacity, graduated in 0.1 mL divisions.
- (g) A balance of 100 g capacity, accurate and readable to 0.2 mg.
- (h) A thermometer reading to 110°C graduated at 1°C intervals.
- (i) A 400 mL or 600 mL beaker for use as a water bath.
- (j) Tongs or asbestos gloves to handle containers of hot molten material.
- (k) Xylene, chemically pure, having a boiling range from 137°C to 140°C when distilled in accordance with AASHO Specification, Designation T115. Heptane, chemically pure, normal homologue.

4. Preparation of Sample

Melt the sample, if necessary, in its original container by means of the air oven at 100°C to 110°C avoiding unnecessary exposure to the air. Stir thoroughly and pour off a portion of about 100 g into a metal container. Heat this portion on the hotplate until sufficiently fluid to pour into the tared flask.

5. Procedure

- (a) Weigh to the nearest mg, 2 ± 0.02 g of a representative portion of the sample into the flask. Warm gently so that the material spreads in a thin film covering the bottom and lower portion of the flask which is then allowed to cool in air at a temperature of 13°C to 25°C. Prepare two or more specimens at a time.
- (b) Prepare mixtures of xylene and heptane in which the percentage of xylene by volume is made to vary by 5 per cent increments calculated on the basis of a total volume of solvent of 10.2 mL. This is made up by placing the required volume of xylene in a flask and adding heptane to make up the volume to 10.2 mL.

- (c) Add 10.2 mL of the selected solvent mixture to the flask containing the sample. Insert the cork stopper with a glass tube fitted, and swirl with a rapid circular motion for about 5 seconds. Immerse the flask up to the neck in a bath of gently boiling water.
- (d) At the end of each minute remove the flask from the water and swirl for 5 seconds until complete dispersion has taken place.
- (e) If dispersion is not complete within 8 minutes then discard the test solution and repeat on a second solution, this time immersing in a glycerol or glycol bath heated to a temperature of about 115°C, until dispersion is secured within the stipulated time of 8 minutes.
- (f) After complete dispersion has been effected, as judged by the absence of insoluble matter on the glass bottom when the flask is tilted, push down the glass tube below the level of the liquid and allow to cool for 30 minutes in air at a temperature of 18°C to 25°C.
- (g) Lift up the glass tube above the level of the liquid and warm the test solution for 15 minutes in a water bath maintained at a temperature of $32 \pm 0.5^\circ\text{C}$. Stir thoroughly and by means of a clean stirring rod place a drop of the warm mixture on the filter paper held above the bench in a horizontal position.
- (h) Examine the spot after 5 minutes by holding the paper at arms length with the plane of the paper at right angles to the line of vision and with a good light source (preferably diffused daylight) at the observer's back.
- If the drop forms a brown or yellowish-brown circular stain with a darker solid or annular nucleus, report as positive. If, however, the drop forms a uniformly brown circular stain, reserve judgement and set aside the bitumen solvent mixture in its tightly stoppered flask at room temperature in subdued light to be retested 24 hours after the first examination.
- (i) After 24 hours, warm the mixture to $32 \pm 0.5^\circ\text{C}$ as before then vigorously stir with the glass rod and place a drop from the rod onto the paper. If the drop from the 24 hour old mixture still forms a uniformly brown circular stain, report the test as negative, but if a darker solid or annular nucleus now forms near the centre of the stain then report the test as positive.
- (j) The procedure is continued with further solvent mixtures of more or less xylene content at 5 per cent increments until two solvent mixtures have been found, one of which shows a positive spot and the other shows a negative spot.

6. Reporting

Report the result as a percentage heptane xylene equivalent based on the xylene content of the two solvent mixtures bracketing the transition stage as described in *Procedure (j)*.

For example, a 10-15 percentage heptane xylene equivalent indicates that the end point result lies between the two solvent mixtures with 10 per cent and 15 per cent xylene in the mixture.

7. Techniques

As homologues of xylene can exist in samples boiling within the specified range it is advisable to check the result with locally supplied xylene with that obtained by xylene obtained from Phillips Petroleum Company, Oklahoma and U.S.A.