

TEST METHOD T608

BITUMEN CONTENT OF BITUMINOUS PLANT MIX

REVISION SUMMARY

Date	Clause Number	Description of Revision	Authorised By Gen Mgr Pavements
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TEST METHOD T608

BITUMEN CONTENT OF BITUMINOUS PLANT MIX

1. SCOPE

This test method sets out the procedure for determining by hot solvent extraction, the bitumen content of dense bituminous mixtures containing residual bitumen. This method is commonly referred to as the “Reflux Method”.

2. SAFETY NOTES

Heat resisting gloves or tongs should be used when handling hot bituminous materials. Loosen or puncture lids before heating containers. Solvents such as toluene should be used within a fume cupboard. M.S.D.S. should be consulted before handling any materials.

3. APPARATUS

- (a) Flask, two litre Erlenmeyer type provided with a reflux condenser and an additional stopper for sealing the flask during weighing.
- (b) A heating device, such as a hotplate.
- (c) Balances : one of not less than 3.5 kg capacity, accurate and readable to 0.7 g and another of 250 g capacity, accurate and readable to 0.2 mg.
- (d) Centrifuge to accommodate tubes of 25 mL capacity.
- (e) Laboratory tongs.
- (f) Toluene, commercial grade.

4. TEST SAMPLE

- (a) Warm the sample just sufficiently by heating on the hotplate, to loosen the mass of material.
- (b) Reduce the size of the sample by quartering to obtain the following amounts depending upon the maximum size of aggregate :

5 mm	400 g
10 mm	600 g
20 mm	800 g
40mm	1000 g

5. PROCEDURE FOR DETERMINATION OF BITUMEN CONTENT

- (a) Determine the mass of the flask with stopper, to the nearest 0.5 gram. Designate as M_3 .

- (b) Dry the test sample if necessary, by standing in a current of air at a temperature between 18°C and 25°C, transfer it to the flask and determine the mass. Designate this mass as M_2 .
- (c) Add sufficient toluene to cover the test sample by a depth of about 25 mm. Fit on the reflux condenser and gently warm the flask and contents to dissolve the bitumen, making sure none of the bitumen is baked on the bottom of the flask. (*See Techniques*).

**Caution : Organic solvents should be handled with care :
adequate ventilation in a fume cupboard is essential.**

- (d) Allow to cool to room temperature with the condenser still in position.
- (e) Remove the condenser, fit the stopper and determine the mass. Designate this mass as M_1 .
- (f) Shake the flask and contents, allow to stand for about one minute and pour off a portion of the solvent extract into two balanced centrifuge tubes and centrifuge to separate out any fine suspended mineral matter.
- (g) Without disturbing the suspended mineral matter, pour the free liquid from the tubes into a small metal container, whose mass (M_6) has previously been obtained to the nearest 1 mg. Fit the lid and determine the mass. Designate this mass as M_4 .
- (h) Carefully evaporate the solvent from the container by placing it in its own lid on the edge of the hotplate so that evaporation takes place without boiling.
- (i) When the solvent has been mostly evaporated off, remove the container from its lid and place on the hotplate proper. Continue the evaporation until the bitumen just begins to fume. During this last stage, manipulate the container with tongs to control the heating and to distribute the bitumen. Allow a faint degree of fuming to continue for one to two minutes.
- (j) Remove the container from the hotplate, fit the lid, allow to cool to room temperature and determine the mass to the nearest 1 mg. Designate this mass as M_5 .

6. CALCULATIONS

- (a) Total mass of bitumen in test sample:

$$(b) \frac{(M_1 - M_2) \times (M_5 - M_6)}{M_4 - M_5}$$
$$= B$$

- (c) Total mass of test sample:

$$M_2 - M_3$$
$$= A$$

- (d) Bitumen content per 100 parts of mix:

$$= \frac{B \times 100}{A}$$

- (e) Bitumen content per 100 parts of dry aggregate

$$= \frac{B \times 100}{A - B}$$

7. REPORTING

Report to the nearest 0.1 per cent, the bitumen content based on 100 parts of mix or on 100 parts of dry aggregate.

8. TECHNIQUES

- (a) The time and speed of centrifuging is best determined by experiment. Excessive degree of centrifuging should be avoided, i.e. choose conditions to ensure that the liquid above the suspended mineral matter is virtually ash-free. In decanting off the supernatant liquid from the tube it is advisable not to drain off the entire liquid from the residue.
- (b) A control test should be conducted on a solution in toluene using bitumen of similar grade to that used in the bituminous mixture, as a check on technique adopted in *Determination of Bitumen Content (h) and (i)*. The result of the control test should agree with the theoretical amount of bitumen within a difference of 1 per cent.
- (c) To ensure that an appropriate order of accuracy is obtained in the final result, the portion of solvent extract taken as per Procedure for *Determination of Bitumen Content (f)* should be enough to obtain at least 1 gram of bitumen after evaporation of the solvent.
- (d) Two equal volumes may be evaporated to check whether the final evaporation stage is done correctly.