



## TEST METHOD T610

# TAR CONTENT AND GRADING OF DENSE TAR MIXES

### 1. SCOPE

This test method sets out a procedure for the determination of the tar content of tar mixes and subsequently the particle size distribution of the mineral aggregate by sieve analysis. The test method is a modification of the method proposed by Quality Control Laboratories of BHP Iron and Steel Works - Newcastle.

### 2. SAFETY NOTES

*MSDS should be consulted before handling*

(a) Toluene is highly flammable and toxic. Use in a well ventilated fume cupboard away from naked flame and other possible sources of ignition. Avoid absorption by skin contact or inhalation and splashing in the eyes.

(b) Creosote is flammable, toxic and irritating to the skin. Avoid skin contact and wear eye protection goggles. Skin contamination should be removed as soon as possible using ethanol (methylated spirits). The affected area should then be treated with ferric chloride solution.

### 3. APPARATUS

- (a) Flask, two litre Erlenmeyer type provide with a reflux condenser or a suitable glass funnel.
- (b) A heating device such as a hotplate with adjustable temperature control and covered with a mat of appropriate material to diffuse the heat evenly.
- (c) 3 litre plastic beaker.
- (d) Adaptor to hold sieves in position in the 3 litres plastic beaker.
- (e) Australian Standard Sieves as required.
- (f) Metal dishes and sieve brush.
- (g) 5 litre Buchner flask.
- (h) 250 mm diameter Buchner funnel.
- (i) Plastic wash bottle for toluene.
- (j) Ekqip No 1 or similar filter paper and filter pad to fit the Buchner funnel.
- (k) Drying Oven. Suitable for heating at  $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$ .
- (l) Muffle Furnace capable of operating at  $700^{\circ}\text{C} \pm 25^{\circ}\text{C}$ .
- (m) Silica Ignition dish.

- (n) Balances: one of not less than 3.5kg capacity accurate and readable to 0.1 g and another of 250 g capacity accurate and readable to 0.2 mg.
- (o) Suitable fume cupboard

#### 4. REAGENTS

- (a) Grade I Creosote Oil. (See Note 2).
- (b) Toluene, Commercial grade. (See Note 2).

#### 5. TEST SAMPLE

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

Nominal Size of Mix mm	Minimum Mass of Test Sample g
Under 10	600
10 to 20	800
Over 20	1000

### DETERMINATION OF TAR CONTENT

#### 6. PROCEDURE

- (a) Determine the mass ( $M_2$ ) of the flask to the nearest 0.1g.
- (b) Transfer the test sample to the 2L flask, and determine its mass ( $M_0$ ).  
On a separate sample determine the moisture content by the Dean and Stark Method, T533 ( $W_1$ ).  
Calculate the mass of the dry test sample ( $M_1$ ).
- (c) Add sufficient creosote to cover the sample in the flask and heat the mixture on a hot plate on medium heat (110°C to 15°C) for 1 to 2 hours. Agitate the flask at regular intervals to promote solution and prevent adhesion of the material to the bottom of the flask.
- (d) Warm 300 to 400 mL of creosote in a separate beaker or flask for washing the aggregate free from tar.
- (e) Place the 75µm sieve on the adaptor on the 3 litre plastic beaker and after the digestive period carefully decant the creosote oil and the dissolved tar through the sieve while still hot, retaining the aggregate in the beaker.

- (f) Wash the aggregate with two washes of approximately 150 mL of warm creosote oil, decanting the wash material through the sieve on each occasion and retaining the aggregate in the flask.
- (g) Wash the aggregate with 180 to 200 mL lots of toluene, decanting the liquid carefully through the 75 µm sieve until all creosote oil and tar have been removed from the aggregate (5 to 7 washes should be sufficient).

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

- (h) Place the 600µm sieve on top of the 75µm sieve. Transfer all the aggregate onto the 600µm sieve with washing.
- (i) Place the sieves on a tray or dish and evaporate the toluene on a hot plate in a fume cupboard. Cool, shake and weigh to determine the mass ( $M_3$ ) of material retained on the 75 µm sieve. Retain the material for sieve analysis to determine the particle size distribution.
- (j) Filter the wash liquid in the 3 litre beaker through 2 filter papers using the Buchner apparatus and vacuum, transferring all material from the beaker to the filter paper.
- (k) Dry the filter paper in tared silica dish and ash slowly at 400°C and then completely at 700°C, to constant mass ( $M_4$ ). The ash is considered as filler. The ash of the filter paper may be ignored.

## 7. CALCULATIONS

$$\begin{aligned} \text{Mass of dry test sample taken} &= M_1 = M_0 \frac{100 - W}{100} \\ \text{Mass of Aggregate + Filler} &= M_5 = M_3 + M_4 \\ \text{Percentage of tar in the} &= \frac{M_1 - M_5}{M_1} \times 100 \end{aligned}$$

## 8. REPORTING

Report to the nearest 0.1% the tar content based on the total mass of the mix.

## DETERMINATION OF AGGREGATE GRADING

### 9. PROCEDURE

- (a) Sieve the material retained on the 75 $\mu$ m sieve obtained in 5 (i) above using the appropriate AS sieves, according to the procedure given in Test Method T201, Clause 4.

### 10. CALCULATIONS

Calculate the cumulative percentage passing successive sieves based on the total mass of aggregate plus filler ( $M_3 + M_4$ ) in *Calculations*.

### 11. REPORTING

Report the cumulative percentage of the aggregate passing each sieve to the nearest whole number except for the percentage passing the 75  $\mu$ m sieve (ie Filler Material) which is given to the nearest 0.1 percent.