

Australian Standard®

Methods of testing bitumen and related roadmaking products

Method 9: Determination of water content (Dean and Stark)

1 SCOPE This Standard sets out a procedure for the determination of the water content of a bituminous material.

This Method is applicable to road tars in accordance with AS 1507 and bituminous emulsions in accordance with AS 1160.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS	
1160	Bitumen emulsions for construction and maintenance of pavements
1507	Road tars for pavements
2341	Methods of testing bitumen and related roadmaking products
2341.1	Method 1: Precision data — Definitions
R25	Dean and Stark apparatus

3 PRINCIPLE The bituminous material is dissolved in a water-immiscible solvent and the mixture is boiled under reflux in a Dean and Stark apparatus. The water in the condensate of the water/solvent azeotrope is separated by settlement and measured volumetrically.

4 REAGENT The following reagent is required:

Carrier liquid — xylene with a boiling range of 5°C or less, or other suitable aromatic solvent (with the exception of benzene).

WARNING: SINCE XYLENE IS TOXIC AND HIGHLY FLAMMABLE, ALL WORKING AREAS SHOULD BE ADEQUATELY HOODED AND FREE FROM SPARKS AND FLAME.

5 APPARATUS The following items of apparatus are required:

- A glass, round-bottomed flask with a capacity 500 mL to 1000 mL. The flask shall be attached to the Dean and Stark apparatus by means of a ground glass joint as specified in AS R25.
- Dean and Stark receiver — Type I (see AS R25) having a capacity of 10 mL or 25 mL and fitted with a stopcock.
- Condenser, as described in AS R25; the condenser may be fitted with a spray tube.
- Suitable heating apparatus, having controls such as those on an electric mantle.
- Balance, at least 200 g capacity, accurate to 0.1 g.

6 PROCEDURE The procedure shall be as follows:

- Thoroughly mix the sample and weigh a portion into the flask to the nearest 0.1 g, using approximately 100 g for tars and 40 g for bituminous emulsions.
- Add to the flask approximately 100 mL of the carrier liquid and thoroughly mix the contents. (Boiling chips to be added if required.)
- Attach the flask to the Dean and Stark apparatus and ensure that all joints and connections are airtight.
- Heat the flask to raise the temperature to the boiling point of the mixture.
- Adjust the heating so that the distillate collects in the receiver at the rate of 2 drops to 5 drops per second.