भारतीय मानक

तार और बिटूमनी सामग्री की परीक्षण विधियाँ — ऋकयनीय बिटूमेन पायस के भंजन बिन्दु का निर्धारण

Indian Standard

METHODS FOR TESTING TAR AND BITUMINOUS MATERIALS — DETERMINATION OF BREAKING POINT FOR ANIONIC BITUMEN EMULSION

ICS 75.140

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 2

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Bitumen,Tar and Their Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

The term 'anionic' describes bitumen emulsion in which the disperse phase (bitumen) has negative charge and therefore will be attracted to positively charged surface or anode. In an emulsion, bitumen is broken down into billions of microscopically small droplets suspended in each cubic centimetre of emulsion volume. The emulsion thus takes on the characteristics of the dispersing medium — the main one being the fluidity at normal temperature of 5 to 25°C.

Anionic bitumen emulsion finds widespread applications in the field of road construction (mainly with positively charged limestone aggregates), maintenance patching, crack-sealing, asphalt mulch treatment for hill slope stability and water vapour barrier as protective coating applied to concrete and steel structures.

The breaking mechanism of an anionic emulsion differs from those of cationic bitumen emulsion where neutralization of surface charge initiates the breaking process. In an anionic bitumen emulsion, the breaking takes place mainly by evaporation of surface water and hence the process is more temperature dependent. The breaking point of an anionic bitumen emulsion thus becomes all the more important as the performance process starts after the emulsion is broken.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the results of a test or analysis in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

METHODS FOR TESTING TAR AND BITUMINOUS MATERIALS — DETERMINATION OF BREAKING POINT FOR ANIONIC BITUMEN EMULSION

1 SCOPE

This standard covers method for determination of the breaking point of an anionic bitumen emulsion by contact with a reference aggregate. The test applies to emulsions of pure bitumen and to emulsion made of pure cut-back or fluxed bitumens.

2 NORMATIVE REFERENCES

The Indian Standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
334 : 2002	Glossary of terms relating to bitumen and tar (*third revision*)
1211 : 1978	Methods for testing tar and bituminous materials: Determination of water content (Dean and Stark method) (*first revision*)

3 TERMINOLOGY

For the purpose of this standard the definitions given in IS 334 and the following shall apply.

3.1 Breaking Point

The breaking point of a bitumen emulsion is the bitumen of the emulsion fixed on a given amount of aggregate in relation to the amount of bitumen contained in that emulsion.

4 PRINCIPLE

The test consists in introducing a given amount of emulsion and aggregate in a container. The two products are mixed. After an hour, the mixture is washed with distilled water, dried and the weight of bitumen fixed on the aggregate is determined by weighing.

5 APPARATUS AND REAGENTS

5.1 A stainless steel sieve with a mesh size of 150 µm, 40 mm in diameter and 50 mm in height.

5.2 A siliceous aggregate (for example, porphyry, diorite, quartzite) washed and dried, and which passes through a sieve having a mesh size of 2 mm but retained on a sieve having a mesh size of 600 µm. The aggregate is to be kept in a sealed container.

5.3 A balance capable of weighing to an accuracy of 0.01 g.

5.4 A closed vessel maintained at a temperature of approximately 25°C saturated with water vapour (for example, a dessicator where pan at the bottom is filled with water).

5.5 A 100 ml pyrex beaker.

5.6 A glass stirring rod approximately 5 mm in diameter and approximately 30 mm longer than beaker.

5.7 Trichloroethylene, acetone and distilled water

6 PREPARATION OF THE SAMPLE

The emulsion shall be filtered through a stainless steel sieve having a mesh size of 600 µm and is thoroughly homogenized by stirring.

7 PROCEDURE

7.1 The test shall be carried out at a temperature of 25°C.

7.1.1 Determine the water content (E) of the emulsion as per the method described in IS 1211.

7.1.2 Clean the beaker, the stirring rod and the sieve in trichloroethylene and acetone. Then dry in an oven at a temperature of 110°C and allow to cool to ambient temperature.

7.1.3 Weigh 10 ± 0.1 g aggregate into the beaker and then weigh the beaker together with the aggregate, sieve and stirring rod to an accuracy of ±0.01 g. The mass obtained (A) is expressed in g.

7.1.4 Place the beaker and aggregate in the closed vessel saturated with water vapour for one hour.

7.1.5 Add approximately 10 g of emulsion to the beaker. Determine the mass of emulsion (D) expressed in ±0.01 g.

7.1.6 Mix for approximately 15 seconds with the stirring rod in order to completely coat the aggregate with emulsion.

7.1.7 Place the beaker and its contents plus the stirring rod in the closed vessel that is saturated with water vapour, taking care to place a filter paper moist with distilled water, on the beaker. Leave in the closed vessel for one hour.

7.1.8 Remove the beaker and pour 50 ml of distilled water into it. Mix gently and pour the water over the sieve of 150 μm size which has been moistened with distilled water. Do not allow any aggregate to be poured out with it.

7.1.9 Repeat this procedure until the water rinsing off is perfectly clear.

7.1.10 Put the sieve and the stirring rod in the beaker and place them in an oven at 105°C and leave until a constant mass is produced (about 2 h). Weigh to the nearest 0.01 g (*B*).

8 CALCULATION

Calculate before hand the mass of bitumen in emulsion *C* expressed in g corresponding to the mass of emulsion *D*.

$$C = \frac{(100 - E) \times D}{100}$$

The breaking point (I_a) is equal to

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

NOTE

1 If I_a is less than 0.5 percent, give the result as 0.

2 If I_a is between 0.5 to 1.0 percent, give the result rounded to nearest decimal fraction.

3 If I_a is greater than 1 percent, give the result round to the nearest unit.

9 PRECISION

9.1 Repeatability

The test results conducted by an individual shall not be considered suspect unless they differ more than the following:

R = 1, if the breaking point is between 1 and 10 percent, and

R = 0.1 m, if the breaking point is greater than 10 percent.

where

m = mean of two results.

9.2 Reproducibility

The test results conducted by two different laboratories shall not be considered suspect unless they differ by more than the following:

R = 1, if the breaking point is less than or equal to 4 percent; and

R = 0.3 m, if breaking point is greater than 4 percent.

where

m = mean of the two results.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Bitumen, Tar and Their Products Sectional Committee, PCD 6

Organization	*Representative(s)*
Central Road Research Institute, New Delhi	PROF P. K. SIKDAR (***Chairman***) SHRI SUNIL BOSE (*Alternate* I) DR P. K. JAIN (*Alternate* II)
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