भारतीय मानक

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

Indian Standard

METHODS OF TEST FOR TARS AND BITUMINOUS MATERIALS — DETERMINATION OF BREAKING POINT FOR CATIONIC 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 3

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.

Bitumen emulsions are heterogeneous two-phase systems consisting of two immiscible liquids, that is, bitumen and water. The bitumen is dispersed throughout the continuous water phase in the form of discrete globules typically 0.1 – 5.0 mm in diameter which again are held in suspension by electrostatic charges stabilized by an emulsifier.

Neutralization of these electrostatic charges is known as breaking of the bitumen emulsion. The individual bitumen particles coalesce and join together to form a deposition or coating once the charge is neutralized by contact with the aggregates.

In surface dressing construction, the spreading of stone aggregates is resorted to only when the emulsion film turns from brown to black. At this point, it is assumed that the bitumen emulsion has broken. The breaking point of bitumen emulsion can, however, be established more precisely by the addition of silica powder under controlled conditions. The amount of silica powder needed to induce the breaking of bitumen emulsion is then correlated with the breaking time.

The breaking point not only helps in case of construction but also distinguishes the rate of breaking of different types of emulsion.

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 OF TEST FOR TARS AND BITUMINOUS MATERIALS — DETERMINATION OF BREAKING POINT FOR CATIONIC BITUMEN EMULSION

1 SCOPE

This standard covers method for determination of breaking point of a cationic bitumen emulsion with respect to mineral fines. It applies to emulsion of pure bitumen and to emulsion made of cut-back or fluxed bitumens.

2 NORMATIVE REFERENCE

The following Indian Standard contains provision which, through reference in this text, constitutes provision of this standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below:

IS No.	*Title*
334 : 2002	Glossary of terms relating to bitumen and tar (*third 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 amount of reference fines required to induce the breaking point of 100 g of emulsion is to be added steadily to the emulsion according to a conventional procedure. The breaking point is then calculated.

4 REAGENTS

4.1 Silica Fines

Natural silica fines having silicon oxide (SiO_2) percentage of more than 98 percent and density of 2.65 g/ml with neutral *p*H value. The range of particle size shall be as given in Table 1.

Table 1 Range of Particle Size

Residue on Sieve, μm (1)	Percentage (2)
100	1 to 5
80	5 to 10
63	15 to 25
50	10 to 20
40	25 to 35
Passing 40	17 to 30

Before starting the test, the silica fines shall be dried in an oven at 120°C and kept in a sealed container.

5 APPARATUS

5.1 Conical shaped pan with a non-stick surface, having an opening of 2.5 mm diameter such that the flow of fines is between 0.3 to 0.5 g/s or sand pouring cylinder device with which it is possible to obtain the same rate of flow. An example of the apparatus to be used is shown in Fig. 1 to 4.

5.2 Enamel dish measuring 20 cm inside diameter and 10 cm high.

5.3 Nickel spatula, 20 cm long.

5.4 Thermostat regulated tank.

5.5 Balance capable of weighing to an accuracy of 0.1 g.

6 PREPARATION OF THE SAMPLE

6.1 A sample of bitumen emulsion is filtered through a mesh of the size of 600 μm and made thoroughly homogenized by stirring.

6.2 The amount of reference fines necessary for the test is taken from a stock that has previously been homogenized.

7 PROCEDURE

7.1 Keep the emulsion to be tested and 1 kg of reference fines in sealed containers in a thermostat controlled tank, regulated to a temperature of 25 ± 1°C for one hour before carrying out the test.

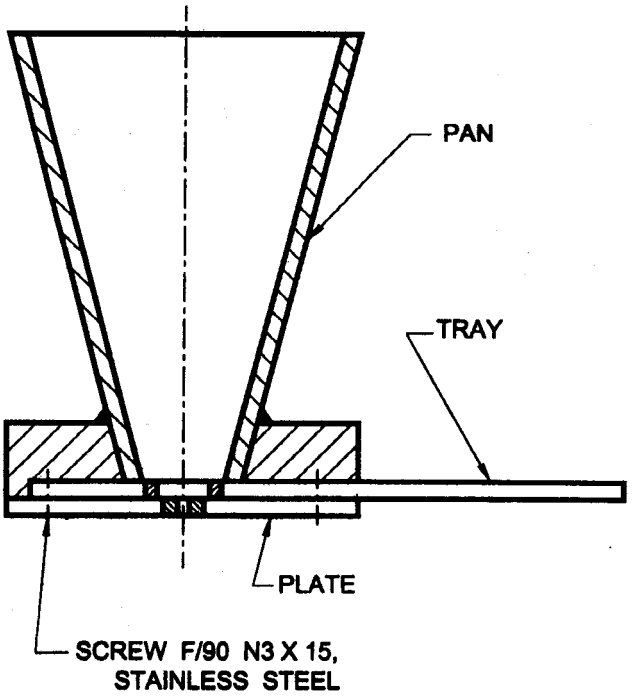
7.2 Weigh to an accuracy of 0.1 g mass (m_1) of the enamel dish containing the nickel spatula.

7.3 Weigh approximately 100 g to within 0.1 g of the emulsion sample into the dish. The mass of the dish, spatula and emulsion together, determine to within 0.1 g (m_2).

7.4 The mass of added emulsion(E) is equal to

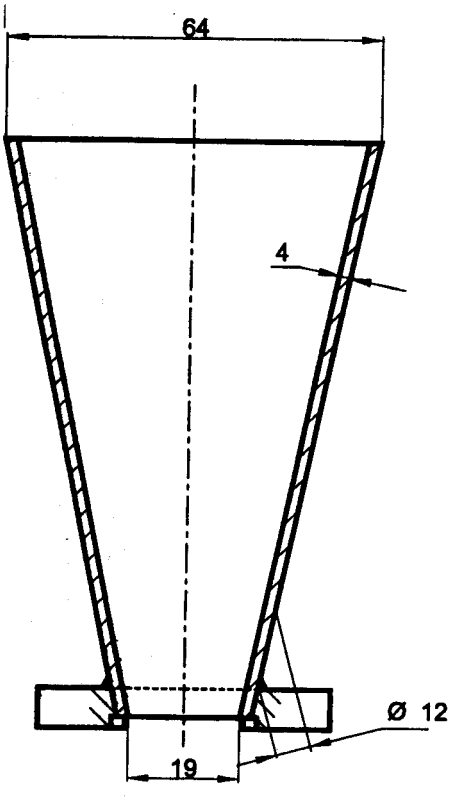
$$E = m_2 - m_1$$

7.5 Place the enamel dish in the thermostat-controlled tank in which the water is maintained at a temperature of 25 ± 1°C.



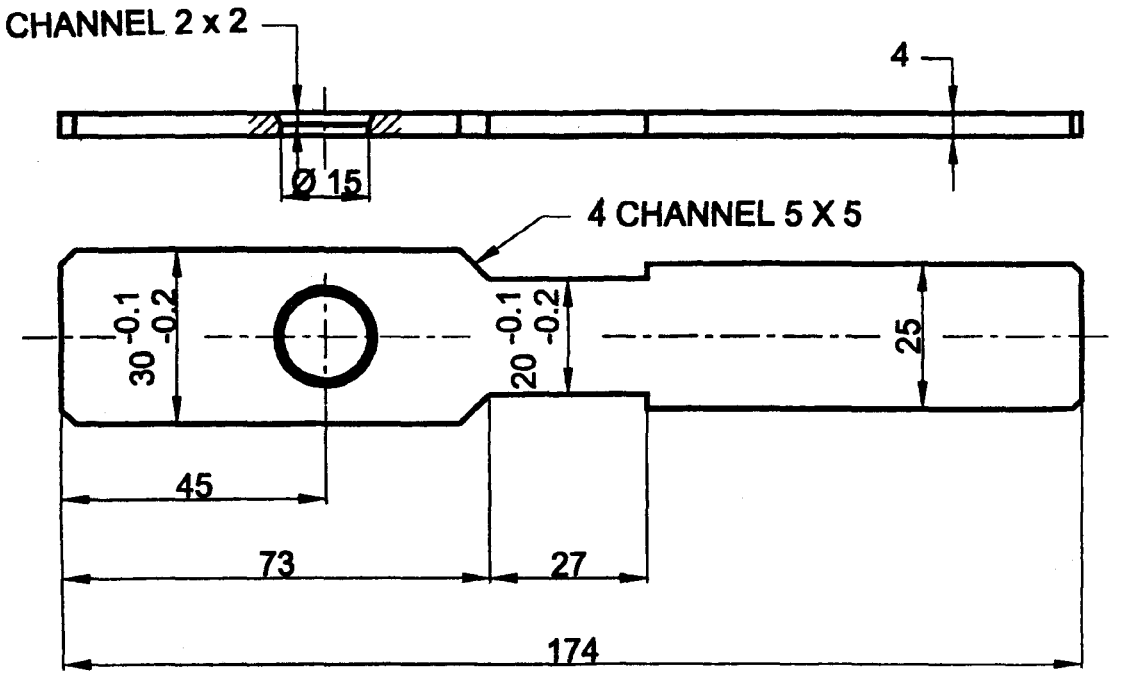
NOTE — Pan, Tray and Plate are of non-Plasticized PVC

FIG. 1 GENERAL VIEW OF THE CONICAL PAN



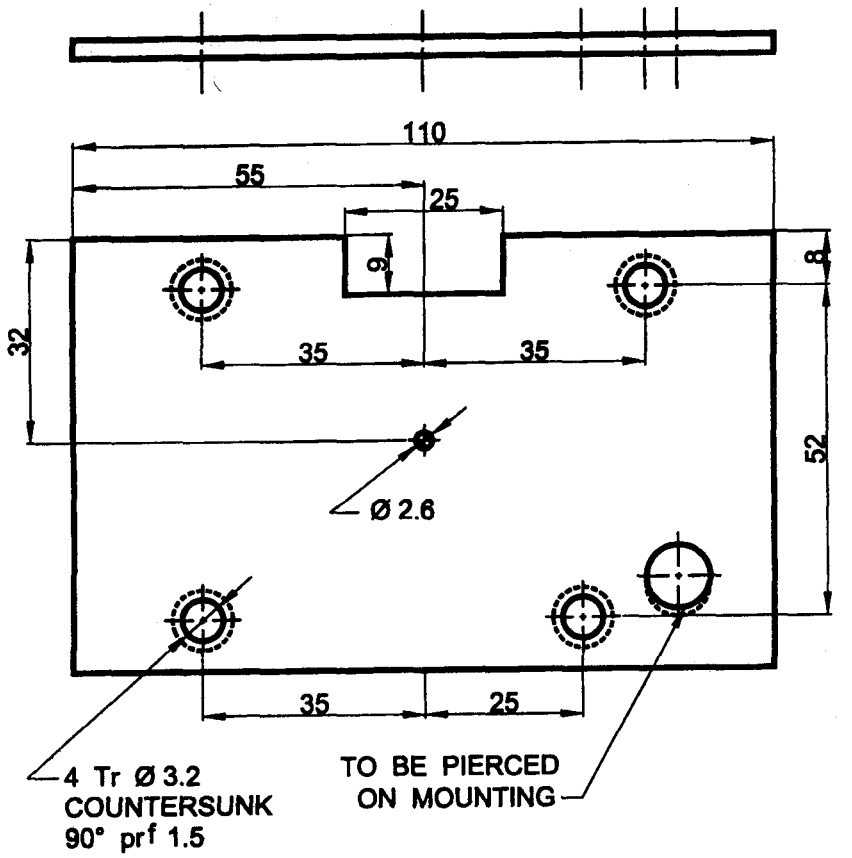
All dimensions in millimetres.

FIG. 2 THE PAN



All dimensions in millimetres.

FIG. 3 THE TRAY



All dimensions in millimetres.

FIG. 4 THE PLATE

7.6 Fill the pan with the reference fines that have been kept at 25°C.

7.7 Put the pan containing approximately 500 g of reference fines on its support.

7.8 Open the pan trap. The fines then drop through steadily into the dish. At the same time, thoroughly mix 1 turn per second, using the spatula.

7.9 Close the trap when the mixture becomes pasty and an isolated clot forms not adhering to the sides of the dish. This clot formation is characteristic of breaking of emulsion.

NOTE — With certain emulsions the formation of a clot is not clear and does not allow a proper result to be recorded. If this is the case, it shall be mentioned in the test report.

7.10 Re-weigh the dish with the nickel spatula to within 0.1 g after having wiped the spatula. This is referred to as m_3.

7.11 The added mass of fines (m) is equal to

$$m = m_3 - m_2$$

8 CALCULATION

8.1 The breaking point (I_c) of emulsion is calculated as follows:

$$I_c = \frac{m}{E} \times 100$$

where

E = mass of emulsion; and

m = mass of reference fines added.

When presenting the results, give the breaking point in relation to silica fines. The breaking point is the mean of the results of three tests.

8.1.1 *Interpretation of Results*

The grades of emulsion shall be identified based on the breaking point (I_c) values obtained at 8.1 as given below:

a) If I_c is less than 20, it shall be identified as rapid setting (*RS*) grade;

b) If I_c is 20-40, it shall be identified as medium setting (*MS*) grade; and

c) If I_c is above 40, it shall be identified as slow setting (*SS*) grade.

9 TEST REPORT

The test report shall include the following information:

a) The type of emulsions tests;

b) The results obtained, notably if the formation of clot is difficult and does not provide a clear test result;

c) Grade of emulsion; and

d) Any details not dealt with in the standard and any incidents likely to have influenced the results.

10 PRECISION

10.1 Repeatability

The results obtained by the same operator shall not differ by more than 0.03 I_c.

10.2 Reproducibility

Preliminary laboratory test results have led to this repeatability value. Other tests are to be carried out to confirm this value and also to add a value for reproducibility.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Bitumen, Tar and Their Products Sectional Committee, PCD 6

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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