

Bitumen and bituminous binders — Determination of particle polarity of bituminous emulsions

ICS 75.140, 91.100.50

National foreword

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English Version

Bitumen and bituminous binders - Determination of particle polarity of bituminous emulsions

Bitumes et liants bitumineux - Détermination de la polarité
des particules des émulsions de bitume

Bitumen und bitumenhaltige Bindemittel - Bestimmung der
Teilchenpolarität von Bitumenemulsionen

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Foreword

This document (EN 1430:2009) has been prepared by Technical Committee CEN/TC 336 "Bituminous binders", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by September 2009.

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1 Scope

This European Standard specifies a method for the determination of the particle polarity of bituminous emulsions.

WARNING — The use of this standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 58, *Bitumen and bituminous binders - Sampling bituminous binders*

EN 12594, *Bitumen and bituminous binders - Preparation of test samples*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)*

ISO 5280, *Xylene for industrial use – Specification*

3 Terms and definitions

For the purposes of this document, the following definition applies.

3.1

particle polarity

sign of the electric charge carried by particles in ionic emulsions

NOTE In cationic emulsions, particles have positive polarity. In anionic emulsions, particles have negative polarity.

4 Principle

A direct or rectified current is passed through a bituminous emulsion between two parallel plate electrodes. Deposition of a layer of bitumen on the anode indicates negative polarity and that the emulsion is anionic. Deposition of particles on the cathode indicates positive polarity and that the emulsion is cationic.

5 Reagents and materials

Use only reagents of recognized analytical grade and water conforming to grade 3 of EN ISO 3696.

5.1 Efficient rinsing agent

Efficient rinsing agents or xylene, conforming to ISO 5280, can be used.

5.2 Propan-2-ol.

5.3 Ethanol, 96 % minimum or methylated spirit 99 %.

6 Apparatus

Usual laboratory apparatus and glassware, together with the following:

6.1 Electrical circuit, (see Figure 1) consisting of the following components:

6.1.1 Current source, capable of supplying a direct or rectified current of 8 mA at a potential of 4,5 V to 15 V for 30 min.

6.1.2 Milliammeter, with a full scale deflection of 10 mA.

6.1.3 Potentiometer.

6.1.4 Electrodes, two stainless steel plates approximately 100 mm long, 25 mm wide and 1,0 mm thick, with an insulating device to hold the plates parallel and 12 mm apart in the emulsion (see Figure 1).

6.1.5 Insulator, polytetrafluoroethylene resin square rod, virgin electrical grade, (12 ± 2) mm long, (25 ± 2) mm wide and (15 ± 5) mm thick.

6.2 Glass beaker, 150 ml or 250 ml capacity.

6.3 Glass rod, approximately 100 mm long and 6 mm thick or other suitable device that is capable of insulating and suspending the electrode assembly in the emulsion.

6.4 Timing device, stop watch or other suitable device.

7 Sampling

The laboratory sample shall be sampled in accordance with EN 58 and shall be prepared in accordance with EN 12594.

The sample shall be divided into two portions; in case of doubt concerning the results, both portions shall be tested.

8 Procedure

8.1 Preparation of electrodes

Clean the electrodes (6.1.4) in the following sequence:

- wash with water;
- wash with propan-2-ol (5.2) or ethanol or methylated spirit (5.3);

- wash with rinsing agents or xylene (5.1);
- wash with propan-2-ol (5.2) or ethanol (5.3);
- wash with water.

8.2 Pour sufficient emulsion into a beaker (6.2) to permit immersion of the electrodes to a depth of approximately 25 mm in the emulsion. Suspend the electrodes, separated by the insulator (6.1.5) from the glass rod. Immerse the electrodes to the required depth in the emulsion by placing the glass rod across the top of the beaker (6.3).

NOTE Any apparatus capable of manual height adjustment and of insulating and suspending the electrodes in the emulsion may be used.

8.3 Connect the electrodes to the direct current source (6.1.1), the gap between the 2 electrodes shall be equal to (12 ± 2) mm, as shown on Figure 1.

8.4 Adjust the current to between 8 mA and 10 mA with the potentiometer (6.1.3) and start timing with the suitable timing device (6.4). Record the current used.

8.5 When the current drops to 2 mA, or at the end of 30 min, whichever occurs first, disconnect the current source, and gently wash the electrodes in running water.

8.6 Observe the deposition of bituminous binder on the electrodes, and record the polarity.

NOTE A cationic emulsion (with positive polarity) will deposit an appreciable layer of binder on the cathode (negative electrode). An anionic emulsion (with negative polarity) will deposit an appreciable layer of binder on the anode (positive electrode).

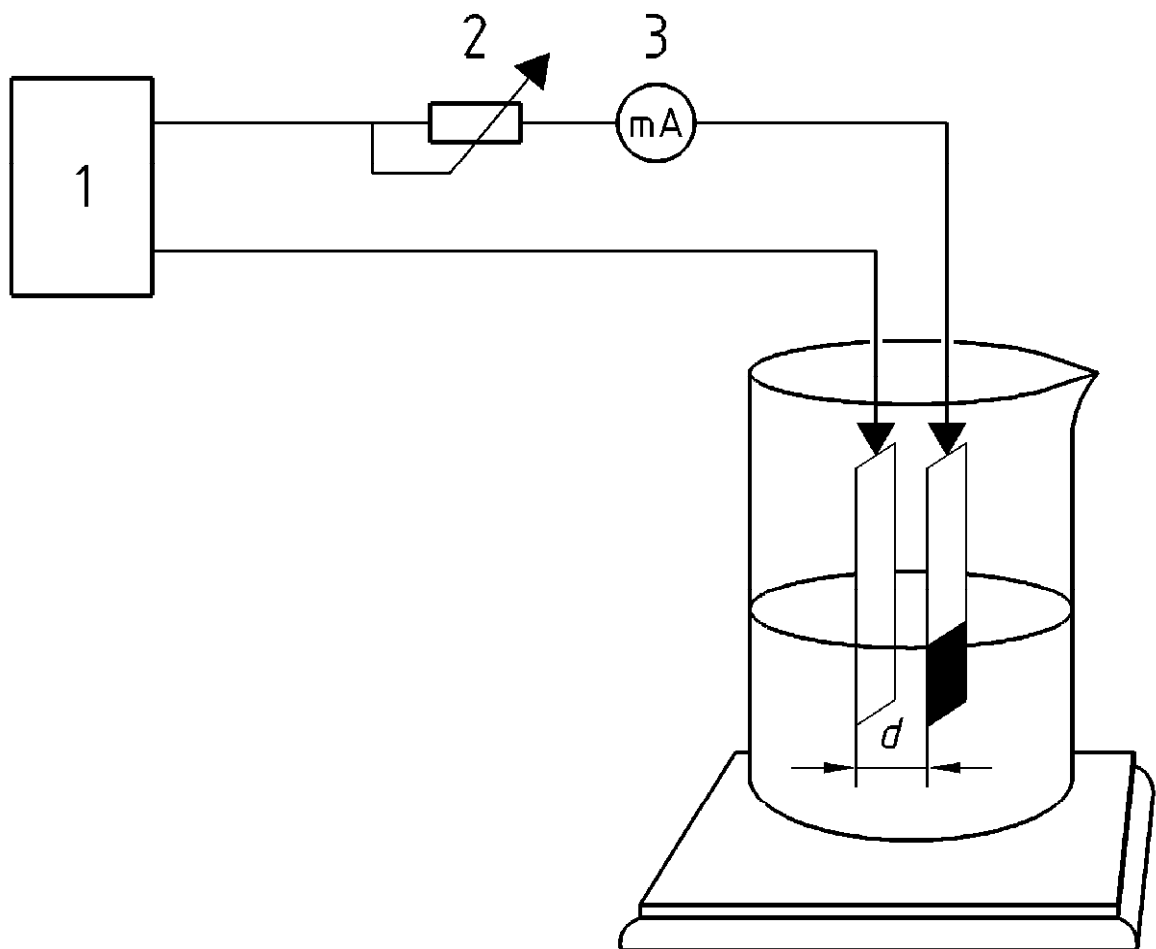
9 Expression of results

Express the polarity of bituminous particles in the emulsion as positive or negative (see 8.6).

10 Test report

The test report shall contain at least the following information:

- a) type and complete identification of the sample under test;
- b) reference to this European Standard;
- c) intensity of the current used (see 8.4);
- d) result of the test (Clause 9);
- e) any deviation, by agreement or otherwise, from the procedure specified;
- f) date of the test.



KEY

- 1. Current source
- 2. Potentiometer
- 3. Milliammeter

d: distance between the two electrodes
 $d = (12 \pm 2)$ mm

Figure 1 — Example of test apparatus layout with electrical circuit

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