

Methods of test for petroleum and its products — BS 2000-222: Bitumen and bituminous binders — Determination of dynamic viscosity by vacuum capillary (Identical with IP 222-2000)

The European Standard EN 12596:1999 has the status of a
British Standard

ICS 75.140; 91.100.50

National foreword

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 16, an inside back cover and a back cover.

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English version

Bitumens and bituminous binders – Determination of dynamic viscosity by vacuum capillary

Bitumes et liants bitumineux – Détermination de la viscosité dynamique par viscosimètre capillaire sous vide

Bitumen und bitumenhaltige Bindemittel – Bestimmung der dynamischen Viskosität mit Vakuum-Kapillaren

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 19, Petroleum products, lubricants and related products, the Secretariat of which is held by NNI.

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of an identical text or by endorsement, at the latest by May 2000, and conflicting national standards shall be withdrawn at the latest by May 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This draft European Standard is based on ASTM D 2171-94.

This standard includes 3 annexes where annexes A and B are normative and annex C is informative.

1 Scope

This European Standard specifies a method for the determination of the dynamic viscosity of bituminous binders by means of a vacuum capillary viscometer at 60 °C in the range from 0,0036 Pa·s to over 580 000 Pa·s.

NOTE: The viscosity behaviour of some polymer modified bitumens (PMB) is not demonstrated in a vacuum capillary viscometer. Other methods are more relevant.

WARNING The use of this standard can 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

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

3 Terms and definitions

For the purposes of this European Standard, the following definitions apply.

3.1

dynamic viscosity

ratio between the applied shear stress and the velocity gradient

NOTE 1: Dynamic viscosity is a measure of the resistance to flow of a liquid under gravity, and is commonly called the viscosity of the liquid. For the purposes of this standard, the word viscosity means the dynamic viscosity of a liquid.

NOTE 2: The SI unit of dynamic viscosity is Pa·s.

3.2

newtonian liquid

liquid having a viscosity that is independent of the rate of shear

NOTE: The constant ratio of the shear stress to the velocity gradient is the viscosity of the liquid. If the ratio is not constant, the liquid is non-newtonian.

4 Principle

The time for a fixed volume of the liquid to be drawn up through a capillary tube by means of vacuum, under closely controlled conditions of vacuum and temperature is determined. The viscosity is calculated by multiplying the flow time in seconds by the viscometer calibration factor.

5 Apparatus

5.1 Viscometer, capillary-type, made of borosilicate glass, as described in 5.1.1 to 5.1.3.

Calibrated viscometers are available from commercial suppliers. Details regarding the calibration of viscometers are given in annex C.

NOTE: Tables A.1, A.2, A.3 and Figures A.1, A.2, A.3 are given in annex A.

5.1.1 Cannon Manning vacuum capillary viscometer (CMVV)

- The CMVV is available in eleven sizes (Table A.1), covering a range from 0,0036 Pa·s to 8 000 Pa·s.
- Details of the design and construction of CMVV are shown in Figure A.1. The size numbers, approximate bulb factors, K , and viscosity ranges for the series of CMVV are given in Table A.1.
- For all viscometer sizes, the volume of measuring bulb C is approximately three times that of the bulb B. Bulbs B, C and D are separated by timing marks F, G and H.

5.1.2 Asphalt Institute vacuum capillary viscometer (AIVV)

- The AIVV is available in seven sizes (Table A.2) covering a range from 4,2 Pa·s to 580 000 Pa·s. Sizes 50 through 200 are best suited to viscosity measurements of bituminous binders at 60 °C.
- Details of design and construction of the AIVV are shown in Figure A.2. The size numbers, approximate capillary radii, approximate bulb factors, K , and viscosity range for the series of AIVV are given in Table A.2.
- This viscometer has measuring bulbs B, C and D located on the viscometer arm, M, which is a precision bore glass capillary. The measuring bulbs are 20 mm long capillary segments, separated by timing marks F, G, H and I.

5.1.3 Modified Koppers vacuum capillary viscometer (MKVV)

- The MKVV is available in five sizes (Table A.3) covering a range from 4,2 Pa·s to 20 000 Pa·s. Sizes 50 through 200 are best suited to viscosity measurements of bituminous binders at 60 °C.
- Details of design and construction of the MKVV are shown in Figure A.3. The size numbers, approximate capillary radii, approximate bulb factors, K , and viscosity ranges for the series of MKVV are given in Table A.3.