

Methods of test for

Petroleum and its products

**Part 179. Determination of cone penetration
of petrolatum**

(Identical with IP 179/79(85))

Confirmed January 2010

Foreword

This British Standard, having been prepared under the direction of the Petroleum Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 28 February 1993.

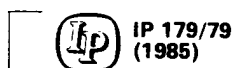
This British Standard supersedes BS 2000 : Part 179 : 1990, which is withdrawn.

BS 2000 comprises a series of test methods for petroleum and its products that are published by the Institute of Petroleum (IP) and have been accorded the status of a British Standard. Each method should be read in conjunction with the preliminary pages of 'IP Standard methods for analysis and testing of petroleum and related products' which gives details of the BSI/IP agreement for publication of the series, provides general information on safety precautions, sampling and other matters, and lists the methods published as Parts of BS 2000.

The numbering of the Parts of BS 2000 follows that of the corresponding methods published in 'IP Standard methods for analysis and testing of petroleum and related products'. Under the terms of the agreement between BSI and the Institute of Petroleum, the revised version of BS 2000 : Part 179 will be published by the IP (in 'Standard methods for analysis and testing of petroleum and related products' and as a separate publication). BS 2000 : Part 179 : 1993 is thus identical with IP 179/79, which was reapproved in 1985. Square brackets marked in the margin of this IP Standard indicate text that differs from the previous edition.

IP 179 was first published as a British Standard as BS 4698 (now withdrawn) which was subsequently renumbered and issued in the BS 2000 series.

Compliance with a British Standard does not of itself confer immunity from legal obligations.



Determination of cone penetration of petrolatum¹

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.

This method was adopted as a joint ASTM-IP Standard Method in 1965.

FOREWORD This method is technically equivalent to DIN 51580

SCOPE

1. This method of test is intended for use in measuring with a penetrometer the penetration of petrolatum as an empirical measure of consistency.²

DEFINITION

2. *Penetration* of petrolatum is the depth, in tenths of a millimetre, that a standard cone will penetrate the sample under fixed conditions of mass, time, and temperature.

OUTLINE OF METHOD

3. The sample is melted, heated to 82°C and then cooled under controlled conditions to 25°C. The penetration is measured with the cone and the sample at this temperature using a penetrometer by means of which a standard cone is applied to the sample for 5 sec under a load of 150 g.

APPARATUS

4. (a) *Penetrometer and Cone* – as specified in Method ASTM D217, Test for Cone Penetration of Lubricating Grease, Method IP 50, Penetration of Grease.

(b) *Oven* – capable of maintaining a temperature of 82±2°C for melting the petrolatum samples.

(c) *Water Bath* – a constant temperature water bath regulated to 25±0.5°C.

(d) *Sample Containers* – cylindrical, having a flat bottom, 100±6 mm dia and 65 mm or more in depth, constructed of at least 16 gauge (1.6 mm) metal and provided with a well fitting water-tight cover.

NOTE 1: Containers of the 'ointment box' type having somewhat flexible sides should not be used, for these permit slight working of the petrolatum, due to flexing of the sides in handling.

¹Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-2 on Petroleum Products and Lubricants.

In the IP, this method is under the jurisdiction of the Standardization Committee.

²This procedure is applicable to petrolatums having penetrations up to 250. A sample of 2 kg is required. (For petrolatums having penetrations less than 200 one-third of these quantities is adequate.)

PREPARATION OF SAMPLE

5. (a) Test all samples of petrolatum for original consistency after melting and cooling to the temperature of the test as described in paragraph (c).

(b) If the penetration of the sample is over 200, three separate test samples are required.

(c) Melt the sample in an oven maintained at 82±2°C. Place the required number of sample containers in the oven along with the sample to bring them up to 82°C. When the sample has melted and comes to within 3°C of the temperature, remove the sample and the heated containers and fill the required number of containers to within 6 mm of their rims. Allow the filled containers to cool in a location free from draughts and at a temperature controlled to 25±2°C for 16 to 18 h. Then place the samples in the water bath for 2 h to bring the temperature to 25±0.5°C before testing.

NOTE 2: Some compounded petrolatums are affected on contact with water. Such samples must be covered with a sealed lid as required for greases. Uncompounded petrolatums are not affected by water and need not be covered.

PROCEDURE

6. (a) The surface of the sample must not be cut level nor worked in any other way, as this may affect the result. If the temperature of the penetrometer cone (that is, the room temperature) varies from 25°C by 2°C or more, adjust the cone temperature to 25±0.5°C immediately before testing the sample. Frequent adjustment of the cone temperature may be necessary if the room temperature varies appreciably from 25°C.

(b) Place the container filled with the sample on the penetrometer table, so located that the tip of the penetrometer cone is 25 to 40 mm in from the rim of the container (except for petrolatums having a penetration greater than 200, see Section 6(d)). Observe that the cone is in its 'zero' position and adjust either the indicator assembly or the table, dependent on the type of instrument, until the tip of the cone just touches the surface of the sample. Watching the shadow of the tip is an aid to accurate setting. Finally, quickly release the plunger and hold

CONE PENETRATION OF PETROLATUM, IP 179

for 5 sec. Read the total penetration from the scale. Make at least three determinations.

(c) With samples having penetrations less than 200, three tests (and sometimes more) may be made in one container by proper spacing. To prevent one test from being affected by the disturbed area of a previous test the tip of the cone must not be placed nearer the edge of a previous test than the penetration distance of the sample. Some harder petrolatums tend to form a marked depression in the centre on solidifying; such samples should not be tested in this depression, as the results obtained may be different from those obtained in off-centre positions on the level surface.

(d) With samples having penetrations over 200, make only one test in a container and place the cone tip as exactly as possible at the centre of the container.

REPORT

7. Report the average of all results to the nearest 0.1 mm, as the Penetration, ASTM D937-IP 179.

PRECISION

8. The following criteria should be used for judging the acceptability of results (95% confidence level):

(a) *Repeatability* – Duplicate results (each based on the average of three individual values) by the same operator should be considered suspect if they differ by more than the following amount:

Repeatability = $2 + (5\%)$ (Penetration Value).

(b) *Reproducibility* – Results from two laboratories (each based on the average of three individual values) should not be considered suspect unless the two results differ by more than the following amount: Reproducibility = $9 + (12\%)$ (Penetration Value).