

Methods of test for

Petroleum and its products

Part 402. Petroleum products - Determination of Reid vapour pressure - Wet method

(Identical with IP 402/94)

The European Standard EN 12 : 1993 has the status of a
British Standard

UDC 665.7-404:620.1:536.423.15

National 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 31 March 1994. It is the English language version of EN 12 : 1993 *Petroleum products - Determination of Reid vapour pressure - Wet method*, published by the European Committee for Standardization (CEN).

This British Standard supersedes BS 2000 : Part 69 : 1982, which is withdrawn.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, BS 2000 : Part 402/BS EN 12 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 402 : 1994 is thus identical with IP 402/94.

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

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The following BSI references
relate to the work of this
standard:
Committee reference PTC/13
Draft for comment 74/54733 DC



IP 402/94



BS EN 12:1993

BS 2000: Part 402:1994

EUROPEAN STANDARD

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English version

Petroleum products – Determination of Reid vapour pressure – Wet method

Produits pétroliers – Détermination de la pression vapeur Reid – Méthode humide

Mineralölerzeugnisse – Bestimmung des Reid-Dampfdruckes – Nasses Verfahren

This European Standard was approved by CEN on 1993-05-03. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
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Europäisches Komitee für Normung

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Foreword

This European Standard – Petroleum products – Determination of Reid vapour pressure – Wet method, was prepared by the technical committee CEN/TC 19 “Test methods and specifications for petroleum products”, the secretariat of which is held by the Netherlands Standardization Institute (NNI).

In 1967 it was decided by CEN/TC 19 to draft a European method for the determination of the vapour pressure of petroleum products, based on ASTM D 323 (a Reid vapour pressure method, RVP).

PrEN 12 was subsequently drafted and submitted for preliminary vote, with a positive result in 1974, but was held in abeyance awaiting developments within ISO. The ISO standard giving the Reid method for the determination of the vapour pressure of petroleum products (ISO 3007) was published in 1974.

PrEN 12 combined an additional so called “dry” procedure to that stated in ISO 3007, to be applied in case of gasoline containing water soluble constituents. In order to establish the necessity and validity of this additional “dry” procedure for oxygenated fuels, prEN 12 was again held in abeyance.

With the publication of Directive 85/536/EEC on “crude oil saving through the use of oxygenated petrol”, it became necessary to reconsider a “dry” procedure in the RVP method for petrol containing oxygenated compounds.

However, at the 15th and 16th meeting in 1986 and 1987 of CEN/TC 19, it was concluded that “a wet RVP method would be acceptable as European Standard for the determination of the vapour pressure of petrol containing oxygenates within the limits as given in Directive 85/536/EEC, Annex, Column A” (Resolution 13 of the 16th meeting).

Consequently a final version of prEN 12 was prepared, based on the work of WG 15. This standard is a modification of ISO 3007 (1986) but extended to take into account the application to petrol containing oxygenated compounds.

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 March 1994, and conflicting national standards shall be withdrawn at the latest by March 1994.

In accordance with the CEN/CENELEC Internal Regulations, following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies a method for the determination of the absolute vapour pressure of volatile crude oil and volatile non-viscous petroleum products, with vapour pressures below 180 kPa.

This method is applicable to fuels containing oxygenated compounds up to the limits stated in Annex A, column A of this standard. The method is also applicable to fuels containing up to 2,8 % *m/m* total oxygen, if due to ethers only.

NOTE 1 For higher oxygenate contents national standards may be applied until a European Standard has been developed.

NOTE 2 Because the external atmospheric pressure is counteracted by the atmospheric pressure initially present in the air chamber, the "Reid vapour pressure" is approximately the absolute vapour pressure of the material at 37,8 °C in kilopascals (bars). The "Reid vapour pressure" differs from the true vapour pressure of the sample owing to slight vaporization and the presence of water vapour and air in the confined space.

2 Principle

The liquid chamber of the vapour pressure apparatus is filled with the chilled sample and connected to the air chamber. The apparatus is immersed in a constant temperature bath ($37,8\text{ °C} \pm 0,1\text{ °C}$) and is agitated until equilibrium is reached. The reading of the pressure indicator is the Reid vapour pressure.

WARNING: This standard calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to the technical suitability and in no way absolves the user from statutory obligations relating to health and safety at any stage.

3 Apparatus

The construction of the required apparatus is described in annex B. This method is based upon the use of pressure gauges or a pressurized manometer (annex C). Other pressure indicators may also be used.

Automatic equipment may be used provided it gives equivalent accuracy and precision as the manual method. In case of dispute the manual method is the reference method.

4 Samples and sampling

4.1 General

The general provisions in 4.2 to 4.6 shall apply to all samples for vapour pressure determinations. The extreme sensitivity of vapour pressure measurement to losses through evaporation and to slight changes in composition is such as to require the utmost precaution and the most meticulous care in the handling of samples.

4.2 Sampling procedure

Nationally accepted standards shall be used. Water displacement procedures and the preparation of composite samples are not permitted.

4.3 Sample container

The capacity of the sample container from which the vapour pressure sample is taken shall not be less than 1 l. It shall be filled with sample to between 70 % and 80 % of its capacity.

4.4 Sample handling temperature

The sample container and its contents shall be cooled to a temperature of 0 °C to 1 °C before the container is opened.

4.5 Sample transfer

The Reid vapour pressure determination shall be the first test carried out on the sample. If it is necessary to transfer samples from larger sample containers or to withdraw samples for testing, the method of transfer as shown in figure 1 shall be used.

4.6 Care of samples

Samples shall be put in a cool place as soon as possible after they have been obtained and held there until the test has been completed. Samples in leaking containers shall not be considered for testing but shall be discarded and new samples obtained.

5 Preparation for test

5.1 Air saturation of sample in sample container

Place the sample, in its container, into the cooling bath or refrigerator. With the sample at a temperature of 0 °C to 1 °C take the container from the cooling bath or refrigerator, unseal it and examine it for its liquid content, which shall be between 70 % and 80 % of the container capacity. If the container is more than 80 % full, pour out sample till the container contents are within the 70 % to 80 % range. After the correct liquid content has been assured, reseal the container, shake it vigorously and return it to the cooling bath or refrigerator. Repeat this procedure of unsealing momentarily, resealing, shaking vigorously, and returning to the bath or refrigerator three times at intervals of not less than 2 min to ensure complete air saturation.

5.2 Preparation of the liquid chamber

Put the open liquid chamber and the sample transfer connection in the cooling bath or refrigerator for a sufficient time (at least 10 min) to allow the chamber and connection to reach the bath temperature (0 °C to 1 °C), ensuring no ingress of water to prevent phase separation.

5.3 Preparation of the air chamber

5.3.1 General

Use the procedure as described in 5.3.2 or 5.3.3 (see note 3).

NOTE 3 In the preparation of the air chamber, the 37,8 °C procedure is preferred but the ambient temperature procedure gives equivalent results.