

Methods of test for petroleum and its products —

**BS 2000-526: Liquid petroleum
products — Determination of
hydrocarbon types and oxygenates in
petrol — Multidimensional gas
chromatography method**

(Identical with IP 526-2005)

The European Standard EN 14517:2004 has the status of a
British Standard

ICS 75.160.20

National foreword

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The UK participation in its preparation was entrusted to Technical Committee PTI/13, Petroleum testing and terminology, which has the responsibility to:

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Summary of pages

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English version

Liquid petroleum products - Determination of hydrocarbon types
and oxygenates in petrol - Multidimensional gas chromatography
method

Produits pétroliers liquides - Détermination des familles
d'hydrocarbures et de la teneur en composés oxygénés de
l'essence automobile - Méthode par chromatographie
multidimensionnelle en phase gazeuse

Flüssige Mineralölerzeugnisse - Bestimmung der
Kohlenwasserstoffgruppen und sauerstoffhaltigen
Verbindungen in Ottokraftstoffen - Multidimensionales
gaschromatographisches Verfahren

This European Standard was approved by CEN on 21 June 2004.

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.

This European Standard exists 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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Foreword

This document (EN 14517:2004) has been prepared by Technical Committee CEN/TC 19 “Petroleum products, lubricants and related products”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by March 2005, and conflicting national standards shall be withdrawn at the latest by March 2005.

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

1 Scope

This document specifies the gas chromatographic determination of saturated, olefinic and aromatic hydrocarbons in finished petrol according to EN 228. Additionally, the benzene content, oxygenate compounds and the total oxygenate content can be determined.

The method is applicable for finished petrol with total aromatic content up to 50 % (V/V), total olefin content from about 1,5 % (V/V) up to 30 % (V/V), oxygenate compounds up to 15 % (V/V), total oxygen content from about 1,5 % (m/m) to about 3 % (m/m) and benzene content less than 2 % (V/V).

NOTE 1 For the purposes of this European Standard, the terms “% (m/m)” and “% (V/V)” are used to represent respectively the mass fraction and the volume fraction.

NOTE 2 While developing this method the final boiling point was limited to 215 °C.

NOTE 3 For oxygenate compounds, precision data has only been established on samples containing ethyl-*tert*-butyl ether (ETBE), methyl-*tert*-butyl ether (MTBE), *tert*-amyl-methyl ether (TAME) and ethanol. Applicability of this test method has also been verified for the determination of methanol, n-propanol, i-propanol, i-butanol, *tert*-butanol, acetone, and *di*-isopropyl ether (DIPE). However, no precision data have been determined for these compounds. If any of these oxygenate compounds are present in the sample, their contents should be determined by use of the appropriate test methods given in EN 228.

NOTE 4 Although this test method may be used to determine higher olefin contents up to 50 % (V/V), the precision for olefins was only tested in the range from about 1,5 % (V/V) to about 30 % (V/V).

NOTE 5 Although specifically developed for the analysis of finished petrol that contains oxygenates, this test method may also be applied to other hydrocarbon streams having similar boiling ranges such as naphthas and reformates.

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 228, *Automotive fuels – Unleaded petrol – Requirements and test methods*.

EN 1601, *Liquid petroleum products – Unleaded petrol – Determination of organic oxygenate compounds and total organically bound oxygen content by gas chromatography (O-FID)*.

EN 13132, *Liquid petroleum products – Unleaded petrol – Determination of organic oxygenate compounds and total organically bound oxygen content by gas chromatography using column switching*.

EN ISO 3170, *Petroleum liquids – Manual sampling (ISO 3170:2004)*.

EN ISO 3171, *Petroleum liquids – Automatic pipeline sampling (ISO 3171:1988)*.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

hydrocarbon group (singular)

family of hydrocarbons such as saturated hydrocarbons, olefinic hydrocarbons, etc.

3.1.1

saturated hydrocarbon

hydrocarbon type such as the n-paraffins, iso-paraffins, naphthenes and poly-naphthenes with 3 to 12 carbon number

3.1.2

olefinic hydrocarbon

hydrocarbon type such as the n-olefins, i-olefins and cyclic olefins with 3 to 10 carbon number

3.1.3

aromatic hydrocarbon

hydrocarbon type benzene, toluene and higher homologous series with 6 to 10 carbon number and naphthalenes up to 12 carbon number

3.1.4

oxygenated hydrocarbon

hydrocarbon type alcohols and ethers, which addition is allowed according to EN 228 (see NOTE 3 in Clause 1).

3.2

partial group

one carbon number in an individual group, being either a single compound like toluene or an isomeric mixture like n-butane and i-butane

4 Principle

4.1 The sample to be analyzed is separated into hydrocarbon groups by means of gas chromatographic analysis using special column-coupling and column-switching procedures.

The sample is injected in the gas chromatographic system and after vaporization separated into the different groups. Detection is always done by a flame ionization detector (FID).

4.2 The mass concentration of each detected compound or hydrocarbon group is determined by the application of relative response factors (see 10.1) to the area of the detected peaks, followed by normalization to 100 %. For samples containing oxygenates that cannot be determined by this test method, the hydrocarbon results are normalized to 100 % minus the value of oxygenates as determined by another method such as EN 1601 or EN 13132. The liquid volume concentration of each detected compound or hydrocarbon group is determined by application of density values (see 10.2) to the calculated mass concentration of the detected peaks followed by normalization to 100 %.

4.3 After this analysis the petrol is separated into hydrocarbon groups and carbon numbers. By the use of the corresponding relative response factors (see Table 1 and Table 2) the mass distributions of the groups can be calculated.