BS EN 12916:2016

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Petroleum products — Determination of aromatic hydrocarbon types in middle distillates — High performance liquid chromatography method with refractive index detection

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National foreword

This British Standard is the UK implementation of EN 12916:2016. It supersedes BS EN 12916:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PTI/15, Natural Gas and Gas Analysis.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Petroleum products - Determination of aromatic hydrocarbon types in middle distillates - High performance liquid chromatography method with refractive index detection

Produits pétroliers - Détermination des familles d'hydrocarbures dans les distillats moyens - Méthode par chromatographie liquide à haute performance avec détection par réfractométrie différentielle

Mineralölerzeugnisse - Bestimmung von aromatischen Kohlenwasserstoffgruppen in Mitteldestillaten - Hochleistungsflüssigkeitschromatographie-Verfahren mit Brechzahl-Detektion

This European Standard was approved by CEN on 13 December 2015.

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European foreword

This document (EN 12916:2016) has been prepared by Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin”, 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of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12916:2006.

The third version of the method has been updated to extend the scope of the method beyond the common diesel products to middle distillates with FAME contents up to 30 % (V/V) on the basis of the results of a study performed on B5, B10, and B30 samples. As the procedure remains unchanged, the precision statement from the previous version is still valid.

Additionally the method allows the use of a backflush to clean the column once the tri+-aromatics have been eluted.

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

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1 Scope

This European Standard specifies a test method for the determination of the content of mono-aromatic, di-aromatic and tri+-aromatic hydrocarbons in diesel fuels that may contain fatty acid methyl esters (FAME) up to 30 % *(V/V)* and petroleum distillates in the boiling range from 150 °C to 400 °C. The polycyclic aromatic hydrocarbons content is calculated from the sum of di-aromatic and tri+-aromatic hydrocarbons and the total content of aromatic compounds is calculated from the sum of the individual aromatic hydrocarbon types.

Compounds containing sulfur, nitrogen and oxygen can interfere in the determination; mono-alkenes do not interfere, but conjugated di-alkenes and poly-alkenes, if present, may do so.

The precision statement of the test method has been established for diesel fuels with and without FAME blending components, with a mono-aromatic content in the range from 6 % (*m/m*) to 30 % (*m/m*), a di-aromatic content from 1 % (*m/m*) to 10 % (*m/m*), a tri+-aromatic content from 0 % (*m/m*) to 2 % (*m/m*), a polycyclic aromatic content from 1 % (*m/m*) to 12 % (*m/m*), and a total aromatic content from 7 % (*m/m*) to 42 % (*m/m*).

NOTE 1 For the purpose of this European Standard, the terms "% *(m/m)*" and "% (*V/V*)" are used to represent the mass fraction and the volume fraction of a material respectively.

NOTE 2 By convention, the aromatic hydrocarbon types are defined on the basis of their elution characteristics from the specified liquid chromatography column relative to model aromatic compounds. Their quantification is performed using an external calibration with a single aromatic compound for each of them, which may or may not be representative of the aromatics present in the sample. Alternative techniques and test methods may classify and quantify individual aromatic hydrocarbon types differently.

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 users of this standard to take appropriate measures to ensure the safety and health of personnel prior to application of the standard, and fulfil statutory and regulatory requirements for this purpose.

2 Normative references

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

EN 14214, *Liquid petroleum products — Fatty acid methyl esters (FAME) for use in diesel engines and heating applications — Requirements and test methods*

EN ISO 1042, *Laboratory glassware - One-mark volumetric flasks (ISO 1042)*

EN ISO 3170, *Petroleum liquids - Manual sampling (ISO 3170)*

EN ISO 3171, *Petroleum liquids - Automatic pipeline sampling (ISO 3171)*

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3 Terms and definitions

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

3.1
non-aromatic hydrocarbon
compound having a shorter retention time on the specified polar column than the majority of mono-aromatic hydrocarbons

3.2
mono-aromatic hydrocarbon
MAH
compound having a longer retention time on the specified polar column than the majority of non-aromatic hydrocarbons, but a shorter retention time than the majority of di-aromatic hydrocarbons

3.3
di-aromatic hydrocarbon
DAH
compound having a longer retention time on the specified polar column than the majority of mono-aromatic hydrocarbons, but a shorter retention time than the majority of tri+-aromatic hydrocarbons

3.4
tri+-aromatic hydrocarbon
T+AH
compound having a longer retention time on the specified polar column than the majority of di-aromatic hydrocarbons, but a shorter retention time than chrysene

3.5
polycyclic aromatic hydrocarbon
POLY-AH
sum of the di-aromatic hydrocarbons and tri+-aromatic hydrocarbons

3.6
total aromatic hydrocarbon
sum of the mono-aromatic hydrocarbons, di-aromatic hydrocarbons and tri+-aromatic hydrocarbons

Note 1 to entry: Published and unpublished data indicate that the major constituents for each hydrocarbon type may include:

a) non-aromatic hydrocarbons: acyclic and cyclic alkanes (paraffins and naphthenes), mono-alkenes (if present),

b) MAHs: benzenes, tetralins, indanes and higher naphthenobenzenes (e.g. octahydrophenanthrenes), thiophenes, styrenes, conjugated polyalkenes,

c) DAHs: naphthalenes, biphenyls, indenes, fluorenes, acenaphthenes, benzothiophenes and dibenzothiophenes,

d) T+AHs: phenanthrenes, pyrenes, fluoranthenes, chrysenes, triphenylenes, benzanthracenes.

3.7
fatty acid methyl ester
FAME
mixture of fatty acid methyl esters derived from vegetable oil or animal fats and complying to the specification defined in EN 14214

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