



SLOVENSKI STANDARD

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Tekoči naftni proizvodi - Metilni estri maščobnih kislin (FAME) za dizelske motorje in ogrevanje - Zahteve in preskusne metode

Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods

Flüssige Mineralölerzeugnisse - Fettsäure-Methylester (FAME) zur Verwendung in Dieselmotoren und als Heizöl - Anforderungen und Prüfverfahren

Produits pétroliers liquides - Esters méthyliques d'acides gras (EMAG) pour moteurs diesel et comme combustible de chauffage - Exigences et méthodes d'essai

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English Version

Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods

Produits pétroliers liquides - Esters méthyliques
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(FAME) zur Verwendung in Dieselmotoren und als
Heizöl - Anforderungen und Prüfverfahren

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 19.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents	Page
European foreword.....	3
Introduction	4
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	8
4 Sampling.....	8
5 Pump marking.....	9
6 Requirements and test methods.....	9
6.1 Dyes and markers	9
6.2 Additives.....	9
6.2.1 General.....	9
6.2.2 Oxidation stability enhancing additives.....	9
6.2.3 Non-FAME components.....	9
6.3 Generally applicable requirements and related test methods.....	9
6.4 Climate dependent requirements and related test methods	12
6.4.1 General.....	12
6.4.2 FAME being used at 100 % as fuel for diesel engines and heating applications	12
6.4.3 FAME being used as blend component in diesel fuel and heating fuel	12
6.5 Precision and dispute	13
Annex A (normative) Correction factor for calculation of density of FAME.....	15
Annex B (informative) Background information for national climate grades selection.....	16
Bibliography.....	19

European foreword

This document (prEN 14214:2024) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 14214:2012+A2:2019.

This document includes the following significant technical changes with respect to EN 14214:2012+A2:2019:

- update to the normative references towards undated versions where they do not concern requirements originating from European Directives (in line with decisions by CEN/TC 19 in coordination with the European Commission), and updating the effective publication dates where required;
- scope extension towards different diesel fuel specifications and heating applications as FAME is being used for more than one blending purpose;
- moving the information on the use of BHT as one example of an oxidation stabilizer in a note;
- inclusion of information on net calorific values for FAME used in heating applications;
- deletion of the requirement on copper corrosion as it is no longer considered meaningful;
- deletion of the requirement on sulphated ash content as it is no longer considered meaningful;
- decrease of the Group I metals (Na+K) content limit from 5,0 mg/kg to 4,0 mg/kg;
- decrease of the Group II metals (Ca+Mg) content limit from 5,0 mg/kg to 4,0 mg/kg;
- introduction of phosphorus content as an additional reporting criterion to be determined with EN 14538 in order to obtain information on actual phosphorus levels and experience with the updated method;
- introduction of saturated monoglycerides content as a reporting criterion in order to obtain information on actual saturated monoglycerides levels and experience with the method;
- deletion of the paragraph on distilled FAME, as there is no general definition of a distilled FAME, keeping the climate-related requirements and test methods for FAME used as blend component untouched and adding a note that FAME meeting these requirements can be produced by, for example, distillation;
- supplement of the subclause 6.5 to clearly identify the arbitration method for each method;
- deletion of EN ISO 20884 as a possible arbitration method for the determination of sulphur content;
- conversion of EN 23015 to EN ISO 3015 as test method for the determination of cloud point (CP);
- inclusion of EN ISO 22995 as an alternative test method for the determination of cloud point (CP);

prEN 14214:2024 (E)

- definition of EN ISO 3015 as the arbitration test method for the determination of cloud point (CP) in cases of dispute;
- deletion of Annex A (and renumbering of the following annexes) after re-evaluation of Table A.1 and conclusion that there are no methods with different precision statements for FAME that are not already addressed in the methods;
- adaptation of Annex B taking into account the introduction of saturated monoglycerides content as a reporting criterion in Table 1.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Introduction

This document gives all relevant characteristics, requirements and test methods for fatty acid methyl esters (FAME), which are known at this time to be necessary to define the product for use in diesel engines and in heating applications.

Many of the test methods included in this document have been the subject of several interlaboratory testing to determine their applicability and their precision in relation to different sources of FAME.

Concerning cold temperature operability of diesel blends related to the quality of the FAME used as a blending component, strong indications towards the relationship with saturated mono-glycerides (SMG) and steryl-glycosides (SG) have become known. As no test method to detect those components separately had been developed, an interim solution in setting cold filter plugging point (CFPP) and cloud point limitations was included in this standard (see Table 3). A study within CEN has indicated that FAME conform to the current precision statements of EN 116 and EN 23015.

With EN 17057, a suitable test method for the direct determination of the content of saturated monoglycerides in FAME is now available. To gain experience in all member states with SMG, the parameter is included as a reporting parameter in Table 1. The information gained will be used for consideration for future limit setting.

Since EN 16934 [1] was published in 2019, data gathered for Europe have shown very low levels of SG below the detection limit and there have been no reported problems in the field that have been attributed to SG content. It is therefore not currently possible to determine an appropriate limit for SG. The situation and data will continue to be monitored.

In order to improve the lifetime of the exhaust aftertreatment system, lowering of the phosphorus limit is under investigation. EN 14538 for the determination of phosphorus has improved precision compared to EN 14107 and EN 16294 and is implemented as a reporting criterion to be able to collect data on phosphorus content in the future.

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1 Scope

This document specifies requirements and test methods for marketed and delivered fatty acid methyl esters (hereafter known as FAME) to be used either as fuel for diesel engines and for heating applications at 100 % concentration, or as a blend component for fuel for diesel engines and heating applications in accordance with the requirements of appropriate standards. At 100 % concentration it is applicable to fuel for use in diesel engines and in heating applications designed or subsequently adapted to run on 100 % FAME.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 116, *Diesel and domestic heating fuels — Determination of cold filter plugging point — Stepwise cooling bath method*

FprEN 12662-2, *Liquid petroleum products — Determination of total contamination — Part 2: Fatty acid methyl esters*

EN 14103, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of ester and linolenic acid methyl ester contents*

EN 14104, *Fat and oil derivatives — Fatty acid methyl ester (FAME) - Determination of acid value*

EN 14105, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of free and total glycerol and mono-, di-, triglyceride contents*

EN 14106, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of free glycerol content*
<https://standards.iteh.ai/catalog/standards/sist/097940d1-72be-4251-b52e-16c64929503d/osist-pren-14214-2024>

EN 14107, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of phosphorus content by inductively coupled plasma (ICP) emission spectrometry*

EN 14108, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of sodium content by atomic absorption spectrometry*

EN 14109, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of potassium content by atomic absorption spectrometry*

EN 14110, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of methanol content*

EN 14111, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of iodine value*

EN 14112, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of oxidation stability (accelerated oxidation test)*

EN 14538, *Fat and oil derivatives — Fatty acid methyl ester (FAME) — Determination of Ca, K, Mg and Na content by optical emission spectral analysis with inductively coupled plasma (ICP OES)*

prEN 14538:2024, *Fat and oil derivatives — Fatty acid methyl ester (FAME) — Determination of Ca, Mg, Na, K and P content by optical emission spectral analysis with inductively coupled plasma (ICP OES)*

EN 15195:2023, *Liquid petroleum products — Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels by combustion in a constant volume chamber*

EN 15751, *Automotive fuels — Fatty acid methyl ester (FAME) fuel and blends with diesel fuel — Determination of oxidation stability by accelerated oxidation method*

EN 15779, *Petroleum products and fat and oil derivatives — Fatty acid methyl esters (FAME) for diesel engines — Determination of polyunsaturated (≥ 4 double bonds) fatty acid methyl esters (PUFA) by gas chromatography*

EN 16294, *Petroleum products and fat and oil derivatives — Determination of phosphorus content in fatty acid methyl esters (FAME) — Optical emission spectral analysis with inductively coupled plasma (ICP OES)*

EN 16300, *Automotive fuels — Determination of iodine value in fatty acid methyl esters (FAME) — Calculation method from gas chromatographic data*

EN 16329, *Diesel and domestic heating fuels — Determination of cold filter plugging point — Linear cooling bath method*

EN 16715:2015, *Liquid petroleum products — Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels — Ignition delay and combustion delay determination using a constant volume combustion chamber with direct fuel injection*

EN 16942, *Fuels — Identification of vehicle compatibility — Graphical expression for consumer information*

EN 17057, *Automotive fuels and fat and oil derivatives — Determination of saturated monoglycerides content in Fatty Acid Methyl Esters (FAME) — Method by GC-FID*

EN 17155:2018, *Liquid petroleum products — Determination of indicated cetane number (ICN) of middle distillate fuels — Primary reference fuels calibration method using a constant volume combustion chamber*

EN ISO 2719, *Determination of flash point — Pensky-Martens closed cup method (ISO 2719)*

EN ISO 3015, *Petroleum and related products from natural or synthetic sources — Determination of cloud point (ISO 3015)*

EN ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104)*

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

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

EN ISO 3675:1998, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method (ISO 3675:1998)*

EN ISO 3679, *Determination of flash point — Method for flash no-flash and flash point by small scale closed cup tester (ISO 3679)*

EN ISO 4259-2, *Petroleum and related products — Precision of measurement methods and results — Part 2: Interpretation and application of precision data in relation to methods of test (ISO 4259-2)*

prEN 14214:2024 (E)

EN ISO 5165:2020, *Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method (ISO 5165:2020)*

EN ISO 12185:1996, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method (ISO 12185:1996)*

EN ISO 12937, *Petroleum products — Determination of water — Coulometric Karl Fischer titration method (ISO 12937)*

EN ISO 13032:2012, *Petroleum products — Determination of low concentration of sulfur in automotive fuels — Energy-dispersive X-ray fluorescence spectrometric method (ISO 13032:2012)*

EN ISO 20846:2019, *Petroleum products — Determination of sulfur content of automotive fuels — Ultraviolet fluorescence method (ISO 20846:2019)*

EN ISO 20884:2019¹, *Petroleum products — Determination of sulfur content of automotive fuels — Wavelength-dispersive X-ray fluorescence spectrometry (ISO 20884:2019)*

EN ISO 22995, *Petroleum products — Determination of cloud point — Automated step-wise cooling method (ISO 22995)*

prEN ISO 23581, *Petroleum products and related products — Determination of kinematic viscosity — Method by Stabinger type viscometer*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

<https://standards.iteh.ai/catalog/standards/sist/097940d1-72be-4251-b52e-16c64929503d/osist-pren-14214-2024>

3.1

fatty acid methyl ester

FAME

ester derived by (trans-)esterification of fats and oils of vegetal or animal origin

4 Sampling

Samples shall be taken in accordance with EN ISO 3170 or EN ISO 3171 for the sampling of automotive diesel fuel or heating fuel.

NOTE National standards or regulations can apply. The national requirements can be set out in a national annex to this document, either in detail or by reference only.

In view of the sensitivity of some of the test methods referred to in this document, particular attention shall be paid to compliance with any guidance on sampling containers, which is included in the respective test method standard.

¹ As impacted by EN ISO 20884:2019/A1:2021