

SLOVENSKI STANDARD

SIST EN 14214:2009+A1:2010

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Goriva za motorna vozila - Metilni estri maščobnih kislin (FAME) za dizelske motorje - Zahteve in preskusne metode

Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods

Kraftstoffe für Kraftfahrzeuge - Fettsäure-Methylester (FAME) für Dieselmotoren - Anforderungen und Prüfverfahren

Carburants pour automobiles - Esters méthyliques d'acides gras (EMAG) pour moteurs diesel - Exigences et méthodes d'essai

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EUROPEAN STANDARD
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Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods

Carburants pour automobiles - Esters méthyliques d'acides gras (EMAG) pour moteurs diesel - Exigences et méthodes d'essai

Kraftstoffe für Kraftfahrzeuge - Fettsäure-Methylester (FAME) für Dieselmotoren - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 25 October 2008 and includes Amendment 1 approved by CEN on 5 October 2009.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 14214:2008+A1:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.

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 includes Amendment 1, approved by CEN on 2009-10-05.

This document supersedes A1 EN 14214:2008 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This European Standard exists in parallel with EN 590.

Significant technical changes between this European Standard and the previous edition are:

- suitable limits and test methods on the esters, glycerides and stability characteristics of FAME resulting from EU-funded research programmes ‘BIOSAB’ and ‘BIOScopes’ have been incorporated, although a possible replacement for iodine value is still under discussion in CEN/TC 19;
- the phosphorus limit has been lowered from 10 ppm to 4 ppm, as a first reasonable step towards meeting the needs of the latest technology engines, being a measurable amount and achievable with not too large investments by the FAME producers;
- allowance of the automatic Pensky-Martens test method as an alternative for flash point determination and a corresponding change of the limit from 120 °C to 101 °C;
- addition of a workmanship subclause (5.4.5);
- inclusion of a note referring to good house keeping via CEN/TR 15367-1;
- a note to clarify that cold flow requirements of fatty acid methyl esters (FAME) when used as an extender for diesel according to EN 590 (as set out in Table 2) do not apply;
- a general update of the revised test methods, some of them already having been included in the Technical Corrigendum to the previous version.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EN 14214:2008+A1:2009 (E)**Introduction**

This European Standard 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 to be used as automotive diesel fuel.

Many of the test methods included in this European Standard were the subject of interlaboratory testing to determine their applicability and their precision in relation to different sources of FAME. These FAME were produced from vegetable oils available in the market at that time, i.e. rapeseed, palm, soy and sunflower oil.

Concerning total contamination, an interlaboratory study with field samples, following a study with artificial samples, is pending and therefore the repeatability and reproducibility of EN 12662 have not yet been fully established. The precision for volume percentage levels of FAME of 7, 10 and 100 will be investigated.

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1 Scope

This European Standard specifies requirements and test methods for marketed and delivered fatty acid methyl esters (hereafter known as FAME) to be used either as automotive fuel for diesel engines at 100 % concentration, or as an extender for automotive fuel for diesel engines in accordance with the requirements of EN 590. At 100 % concentration it is applicable to fuel for use in diesel engine vehicles designed or subsequently adapted to run on 100 % FAME.

NOTE 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.

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 116:1997, *Diesel and domestic heating fuels — Determination of cold filter plugging point*

EN 590, *Automotive fuels — Diesel — Requirements and test methods*

EN 12662:2008, *Liquid petroleum products — Determination of contamination in middle distillates*

EN 14103:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of ester and linolenic acid methyl ester contents*

EN 14104:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of acid value*

EN 14105:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of free and total glycerol and mono-, di- and triglyceride content (Reference method)*

EN 14106:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of free glycerol content*

EN 14107:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of phosphorus content by inductively coupled plasma (ICP) emission spectrometry*

EN 14108:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of sodium content by atomic absorption spectrometry*

EN 14109:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of potassium content by atomic absorption spectrometry*

EN 14110:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of methanol content*

EN 14111:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of iodine value*

EN 14112:2003, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of oxidation stability (accelerated oxidation test)*

EN 14538:2006, *Fat and oil derivatives — Fatty acid methyl esters (FAME) — Determination of Ca, K, Mg and Na content by optical emission spectral analysis with inductively coupled plasma (ICP OES)*

EN 15751:2009, *Automotive fuels — Fatty acid methyl ester (FAME) fuel and blends with diesel fuel — Determination of oxidation stability by accelerated oxidation method*

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EN 15779:2009, *Petroleum products and fats 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* ^{A1}

EN ISO 2160:1998, *Petroleum products — Corrosiveness to copper — Copper strip test* (ISO 2160:1998)

EN ISO 2719:2002, *Determination of flash point — Pensky-Martens closed cup method* (ISO 2719:2002)

EN ISO 3104:1996, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity* (ISO 3104:1994)

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

EN ISO 3171:1999, *Petroleum liquids — Automatic pipeline sampling* (ISO 3171:1988)

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

EN ISO 3679:2004, *Determination of flash point — Rapid equilibrium closed cup method* (ISO 3679:2004)

EN ISO 4259:2006, *Petroleum products — Determination and application of precision data in relation to methods of test* (ISO 4259:2006)

EN ISO 5165:1998, *Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method* (ISO 5165:1998)

EN ISO 10370:1995, *Petroleum products — Determination of carbon residue — Micro method* (ISO 10370:1993)

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

EN ISO 12937:2000, *Petroleum products — Determination of water — Coulometric Karl Fischer titration method* (ISO 12937:2000)

EN ISO 13759:1996, *Petroleum products — Determination of alkyl nitrate in diesel fuels — Spectrometric method* (ISO 13759:1996)

EN ISO 20846:2004, *Petroleum products — Determination of sulfur content of automotive fuels — Ultraviolet fluorescence method* (ISO 20846:2004)

EN ISO 20884:2004, *Petroleum products — Determination of sulfur content of automotive fuels — Wavelength-dispersive X-ray fluorescence spectrometry* (ISO 20884:2004)

ISO 3987:1994, *Petroleum products — Lubricating oils and additives — Determination of sulfated ash*

ASTM D 1160-06, *Standard Test Method for Distillation of Petroleum Products at Reduced Pressure*

3 Sampling

Samples shall be taken as described in EN ISO 3170 or EN ISO 3171 and/or in accordance with the requirements of national standards or regulations for the sampling of automotive diesel fuel. The national requirements shall be set out in a national annex to this European Standard, either in detail or by reference only.

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

4 Pump marking

Information to be marked on dispensing pumps used for delivering FAME diesel fuel, and the dimensions of the mark shall be in accordance with the requirements of national standards or regulations for the marking of pumps for automotive diesel fuel. Such requirements shall be set out in detail or shall be referred to by reference in a national annex to this European Standard.

5 Requirements and test methods

5.1 Dyes and markers

The use of dyes or markers is allowed.

5.2 Additives

In order to improve the performance quality, the use of additives is allowed. Suitable fuel additives without known harmful side effects are recommended in the appropriate amount, to help to avoid deterioration of driveability and emissions control durability. Other technical means with equivalent effect may also be used.

NOTE 1 Deposit forming tendency test methods suitable for routine control purposes have not yet been identified and developed.

NOTE 2 For further information on preventing contamination by water or sediment that may occur in the supply chain it is advisable to check CEN/TR 15367-1 [1].

5.3 Stabilizing agents

[A1] In order to improve the oxidation stability of FAME **[A1]**, it is recommended that stabilizing agents should be added to the product immediately after its production, at least before its eventual blending into a mixture with petroleum based diesel fuel.

5.4 Generally applicable requirements and related test methods

5.4.1 When tested by the methods indicated in Table 1, FAME shall be in accordance with the limits specified in Table 1. The test methods listed in Table 1 have been shown to be applicable to FAME in an interlaboratory test programme. Precision data from this programme are given in normative Annex A, where these were found to be different from the precision data given in the test methods for petroleum products.

5.4.2 In case of a need for identification of FAME, a recommended method based on separation and characterisation of FAME by LC/GC is EN 14331 [2].

5.4.3 In case of a need for a check upon FAME quality, iodine value of FAME may be calculated by the method presented in Annex B, but this method does not constitute an alternative to the iodine value requirement of Table 1. See also the Foreword and Introduction.

5.4.4 The limiting value for the carbon residue given in Table 1 is based on product prior to addition of ignition improver, if used. If a value exceeding the limit is obtained on finished fuel in the market, EN ISO 13759 shall be used as an indicator of the presence of a nitrate-containing compound. If an ignition improver is thus proved present, the limit value for the carbon residue of the product under test cannot be applied. The use of additives does not exempt the manufacturer from meeting the requirement of maximum 0,30 % (*m/m*) of carbon residue prior to addition of additives.