



BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 14214:2012+A1:2014. It supersedes BS EN 14214:2012, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee PTI/2, Liquid Fuels.

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

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© The British Standards Institution 2018
Published by BSI Standards Limited 2018

ISBN 978 0 539 02579 8

ICS 75.160.40

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2015.

Amendments/corrigenda issued since publication

Date	Text affected
31 May 2013	Annex NA and NB included, Annex NC Equation [1] corrected
31 May 2014	Implementation of CEN amendment A1:2014
31 January 2015	Implementation of CEN corrigendum October 2014. Modification to Table A.1
31 October 2018	National Annex NC, subclause NC.3 updated

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EUROPÄISCHE NORM

January 2014

ICS 75.160.20

Supersedes EN 14214:2012

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 d'acides gras (EMAG) pour moteurs diesel et comme combustible de chauffage - Exigences et méthodes d'essai

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

This European Standard was approved by CEN on 20 July 2012 and includes Amendment 1 approved by CEN on 10 November 2013.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 14214:2012+A1:2014) 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 July 2014, and conflicting national standards shall be withdrawn at the latest by July 2014.

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 A1 EN 14214:2012 A1.

This document includes Amendment 1 approved by CEN on 2013-11-10.

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

This document has originally been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

A1 Deleted text A1

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

- extension towards distillate heating fuels. The former specification for FAME for heating fuel applications (EN 14213) also needed to be aligned, but effectively only one quality was supplied and required by heating fuel suppliers in the European market;
- A1 further clarification regarding the use of dyes and markers due to its new heating fuel application; A1
- an update of the specification in the perspective of blending at up to 10 % (V/V) of FAME in automotive diesel fuel;
- A1 removal of identification of parallel existence with EN 590 as FAME is being used for more than one blending purpose; A1
- discrimination between climate requirements for use for 100 % as fuel for diesel engines and for use as blend component in diesel fuel. This is done by introducing a new Table 3 for seasonal grades to be set nationally. It thus requires countries to present two sets of seasonal choices in a national annex to this standard;
- introduction of additional requirements for FAME for use as a blending component as a first, intermediate, step towards solving precipitation problems observed in the market during cold periods. Further work towards limitation of impurities, more specifically steryl-glycosides, and

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anticipated to solve this issue in the longer term;

- a decrease of the monoglycerides content limit from 0,8 % (m/m) to 0,7 % (m/m);
- deletion of the requirement on carbon residue as it is no longer considered necessary;
- an increase of the oxidation stability requirement from 6 h minimum to 8 h minimum;
- introduction of additionally developed test methods for iodine value, phosphorus content $\overline{A_1}$ CFPP and sulfur content, EN 16300, EN 16294, EN 16329 and EN ISO 13032, respectively. $\overline{A_1}$ Plus updating towards revised sulfur and sulfated ash content determination test methods;
- updating of test methods on esters, (mono) glycerides, polyunsaturated fatty acids $\overline{A_1}$ oxidation stability, total contamination, $\overline{A_1}$ and stability characteristics of FAME, resulting from work under CEN/TC 19 and in cooperation with CEN/TC 307, either as final publication or as technically assessed and accepted draft texts. $\overline{A_1}$ The test method procedure for total contamination (EN 12662) has been technically updated to specifically allow improved applicability to FAME (see CEN/TC 19/N 1512R, report I); $\overline{A_1}$
- combination of all sub-clauses dealing with additives in one and aligning them with similar requirements in EN 590.
- $\overline{A_1}$ a re-evaluation of Table A.1 has been executed and it was agreed to complete Annex A by presenting reproducibility information for all test methods that is mainly of interest to people handling the product. $\overline{A_1}$

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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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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 and in heating applications.

Many of the test methods included in this European Standard have been the subject of several interlaboratory testing to determine their applicability and their precision in relation to different sources of FAME. These FAMEs were produced from vegetable oils available in the market at the time, mainly rapeseed, palm, soy and sunflower oil. This does not imply any restrictions towards the feedstock for the fats and oils from which the FAME is made to comply with this European Standard (see Foreword).

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 FAME is investigated.

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

Although there are technical indications that iodine value can be removed as an indication for FAME stability, relaxation at this time would be premature. Until the stability safeguards introduced by this revision have been proven in the market, it is maintained, also preventing unnecessarily high usage of anti-oxidant additives.

In order to meet the needs of the latest technology engines, lowering of the phosphorus limit and the limit of sodium and potassium is under investigation.

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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 fuel for diesel engines and for heating applications at 100 % concentration, or as an extender for distillate fuel for diesel engines in accordance with the requirements of EN 590 and for heating fuel. 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 European Standard, 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, 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 116:1997, *Diesel and domestic heating fuels - Determination of cold filter plugging point*

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

$\overline{A_1}$ EN 12662:2013¹⁾, *Liquid petroleum products — Determination of total contamination in middle distillates, diesel fuels and fatty acid methyl esters* $\overline{A_1}$

EN 14103:2011, *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 14105:2011, *Fat and oil derivatives - Fatty Acid Methyl Esters (FAME) - Determination of free and total glycerol and mono-, di-, triglyceride contents*

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)*

1) Under publication.