BS EN 14214:2012+A2:2019

Incorporating corrigenda May 2013, October 2014, October 2018, October 2019, September 2020 and October 2021

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+A2:2019, incorporating corrigendum October 2014. It supersedes BS EN 14214:2012+A1:2014, which is withdrawn.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 committee manager.

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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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Date	Text affected
31 March 2019	Implementation of CEN amendment A2:2019
31 October 2019	Corrections to National Annex NB, National Annex NC, Subclause NC.3 updated
30 September 2020	National Foreword updated. National Annex NC, Subclause NC.3 updated
31 October 2021	National Foreword updated. National Annex NC, Subclause NC.3 updated

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EUROPEAN STANDARD

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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 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

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European foreword

This document (EN 14214:2012+A2:2019) 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 2019, and conflicting national standards shall be withdrawn at the latest by August 2019.

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

This document supersedes [A2⟩ EN 14214:2012+A1:2014 ⟨A2].

This document includes Amendment 1 approved by CEN on 2013-11-10, Corrigendum 1 issued by CEN on 2014-10-01[1] and Amendment 2 approved by CEN on 2018-12-30.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1⟩ ⟨A1] and [A2⟩ ⟨A2].

This document has originally been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association [A2⟩ *deleted text* ⟨A2].

[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

[1] Amendment 2 completely replaces text of Corrigendum 1.

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regarding monoglyceride determination is on-going. A performance test, such as a filterability test, is 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;

— [A2⟩ inclusion of new and revised test methods resulting from work under CEN/TC 19 and in cooperation with CEN/TC 307 ⟨A2];

— combination of all sub-clauses dealing with additives in one and aligning them with similar requirements in EN 590;

— [A1⟩ 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 [A2⟩ handling the fuel ⟨A2]; ⟨A1]

— [A2⟩ introduction of the new pump marking requirements as developed by CEN/TC 441;

— amalgamation of the B100 fuel climatic grades into one climatic table as most of the original arctic grades cannot be produced;

— alignment of the unit for water content with the reporting unit of the standard test method without changing the requirement;

— introduction of the new Procedure C for the flash point determination via updating of the test method standard;

— reference to recently developed CEN Technical Reports on cold operability testing and on cold filterability issues ⟨A2].

[A2⟩ This second Amendment is to initiate a quick fix for the problems with applying EN 12662:2014 to B100 (referring back to previous standards) and to introduce reference to EN 16942 (fuel labelling). Next, new and revised determination methods are introduced, specifically the change of unit for the determination of water content is aligned with the effective reporting requirement. Those updates require that some methods of dispute (changes) are implemented. This is followed by updates to Annex A, wherein additional corrections for earlier omissions concerning viscosity and metals content are corrected as well. ⟨A2]

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, Serbia, 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).

[A2] Concerning total contamination, several studies have been executed and updates to the test method for biodiesel blends have been made, but work is still pending and therefore the optimal procedure and its repeatability and reproducibility for B100 have not yet been fully established. [A2]

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.

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.

[A2] EN 116:2015, *Diesel and domestic heating fuels — Determination of cold filter plugging point — Stepwise cooling bath method* [A2]

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

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[A2] EN 12662:2008, *Liquid petroleum products — Determination of contamination in middle distillates* [A2]

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*

[A2] EN 14112:2016, *Fat and oil derivatives — Fatty Acid Methyl Esters (FAME) — Determination of oxidation stability (accelerated oxidation test)* [A2]

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)*

[A2] EN 15195:2014, *Liquid petroleum products — Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels by combustion in a constant volume chamber* [A2]

[A2] EN 15751:2014, *Automotive fuels — Fatty acid methyl ester (FAME) fuel and blends with diesel fuel — Determination of oxidation stability by accelerated oxidation method* [A2]

[A2] EN 15779:2009+A1:2013, *Petroleum products and fat and oil derivates — Fatty acid methyl esters (FAME) for diesel engines — Determination of polyunsaturated (≥4 double bonds) fatty acid methyl esters (PUFA) by gas chromatography* [A2]

[A1] EN 16294:2012, *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)* [A1]

[A1] EN 16300:2012, *Automotive fuels — Determination of iodine value in fatty acid methyl esters (FAME) — Calculation method from gas chromatographic data* [A1]

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