

Edition: 2019-07-15

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

Publisher and printing

Austrian Standards International
Standardization and Innovation
Heinestraße 38, 1020 Wien

Copyright © Austrian Standards International 2019

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means – electronic, mechanical and photocopying or any other data carrier – without prior permission!

E-Mail: service@austrian-standards.at
Internet: www.austrian-standards.at/terms-of-use

Sale and distribution of national and foreign standards and technical regulations via Austrian Standards plus GmbH
Heinestraße 38, 1020 Wien
E-Mail: service@austrian-standards.at
Internet: www.austrian-standards.at
Webshop: www.austrian-standards.at/webshop
Tel.: +43 1 213 00-300
Fax: +43 1 213 00-355

ICS 75.160.40

Identical (IDT) with EN 14214:2012+A2:2019-02

Supersedes ÖNORM EN 14214:2017-01

responsible Committee 024
Petroleum products and synthetic and plant substitutes derived thereof

National Foreword

The national provisions required in EN 14214 are being given in the following National Annex.

The changes compared to the previous edition concern

- the exact definition of the CFPP grades in the period from October 1 to October 31
- the deletion of paragraph NA.3 and NA.4

This is a preview of "ONORM EN 14214:2019". [Click here to purchase the full version from the ANSI store.](#)

Annex NA (normative)

National provisions

NA.1 National 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. The current and valid version of legal provisions is to be applied.

BGBI. Nr. 630/1994, *Mineralölsteuergesetz 1995 (Law on mineral oil taxes 1995)*

NA.2 Standards denomination

In accordance with ÖNORM EN 14214 fatty acid methyl esters for diesel engines are to be denoted as follows:

Fatty acid methyl esters ÖNORM EN 14214 – FAME

The following denominations may also be used:

ÖNORM EN 14214 – FAME

or

EN 14214 – FAME

NA.3 ad 5.1 (Dyes and markers)

In accordance with the law on mineral oil taxes 1995 any and all dyes and markers which might result in a falsification of the designation and marking of "Heizöl extra leicht" provided by this law are inadmissible.

NA.4 ad 5.4.2 (FAME being used at 100 % as fuel for diesel engines and heating applications)

The requirements on the temperature limits of filterability are defined as follows:

Climate-dependent behaviour (CFPP grades):

- | | | |
|--------------------------------|-------------------|-----------|
| — April 1 to September 30 | at the most +5°C | (grade A) |
| — October 1 to October 31 | at the most 0 °C | (grade B) |
| — November 1 to February 28/29 | at the most –20°C | (grade F) |
| — March 1 to March 31 | at the most –15°C | (grade E) |

This is a preview of "ONORM EN 14214:2019". [Click here to purchase the full version from the ANSI store.](#)

NA.5 ad 5.4.3. (FAME being used as blend component in diesel fuel)

Climate-dependent requirements for FAME being used as blend component (Table 3a and Table 3b)

For the production of automotive diesel fuel the following requirements are to be met

- from April 1 to October 31 the requirements of grade b (Cloud Point maximum +13 °C, CFPP max. +10 °C) apply,
- from November 1 to March 31 the requirements of grade d (Cloud Point maximum +5 °C, CFPP 0 °C) apply.

The monoglycerid content according to Table 3b is specified with grade 6 (maximum 0,70 % m/m) throughout the whole year.

EUROPÄISCHE NORM

February 2019

ICS 75.160.40

Supersedes EN 14214:2012+A1:2014

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

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents Page

European foreword.....	3
Introduction	5
1 Scope.....	5
2 Normative references.....	5
3 Sampling.....	8
4 Pump marking.....	8
5 Requirements and test methods.....	8
5.1 Dyes and markers	8
5.2 Additives.....	8
5.2.1 General.....	8
5.2.2 Oxidation stability enhancing additives	9
5.2.3 Non-FAME components.....	9
5.3 Generally applicable requirements and related test methods.....	9
Table 1 — Generally applicable requirements and test methods	10
5.4 Climate dependent requirements and related test methods	11
5.4.1 General.....	11
5.4.2 FAME being used at 100 % as fuel for diesel engines and heating applications	12
Table 2 — Climate-related requirements and test methods for FAME fuel	12
5.4.3 FAME being used as blend component in diesel fuel.....	12
Table 3 — Climate-related requirements and test methods for FAME blend component.....	13
Table 3b — Monoglyceride content choices.....	13
5.5 Precision and dispute	13
Annex A (normative) Details of interlaboratory test programme	15
Table A.1 — Precision data from interlaboratory test programme.....	16
Annex B (normative) Correction factor for calculation of density of FAME.....	18
Annex C (informative) Background information for national climate grades selection.....	19
C.1 General.....	19
Table C.1 — Maximum recommended EN 590 diesel saturated monoglyceride contents	20
C.2 Calculation model for saturated monoglycerides in pure FAME	20
C.3 Calculation of EN 590 diesel fuel saturated monoglyceride content.....	20
Bibliography.....	22

This is a preview of "ONORM EN 14214:2019". [Click here to purchase the full version from the ANSI store.](#)

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 2014-10-01¹ 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.

This is a preview of "ONORM EN 14214:2019". [Click here to purchase the full version from the ANSI store.](#)

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.

This is a preview of "ONORM EN 14214:2019". [Click here to purchase the full version from the ANSI store.](#)

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*

This is a preview of "ONORM EN 14214:2019". [Click here to purchase the full version from the ANSI store.](#)

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 derivatives — 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**