Biodiesel

Manufacturer's Affirmative Statement of Compatibility
(As required by California Code of Regulations section 2631(k))

Manufacturer(s) (including prior marketed names)	Model	Component Type (i.e. pipe, tank, etc.)	Current UL Standard Listing	Years Manufactured	Sizes	Unique Identifiers for Field Evaluation (i.e. color, material)	Blend Concentration	Supporting Test Data & Documents Attached
BRUGG Pipesystems	FLEXWELL-HL	Pipe	971 A	Since 1990	1"- 3"		Any	DIN EN 14214

For **tanks and piping** please list only double wall products

(Insert a company logo below if available)

Manufacturer: BRUGG Rohrsysteme GmbH
Corporate Headquarters Address: Adolf-Oesterheld-Str. 31
D-31515 Wunstorf
Germany
Phone: 706.235.5606
Email: Pipesystems.na@brugg.com

BRUGG PIPESYSTEMS
Flexible solutions

I declare, to the best of my knowledge and belief, that this affirmative statement of compatibility and the information contained herein is true, correct, and complete.

Joern Homann
Print Name

Technical Manager
Title

BRUGG Rohrsysteme GmbH
Adolf-Oesterheld-Straße 31
31515 Wunstorf

Manufacturer's Authorized Signature

June 06, 2012
Date

❖ Please complete and submit form to Cory Hootman of the SWRCB at chootman@waterboards.ca.gov.

Agenda für BRG – BPNA Gespräche vom 7./8. Mai

SECON-X II

1. Vollständige technische Daten zur SEC II. Siehe ausgehändigte Tabelle. Spezielle Diskussion des Biegeradius and der Biegbarkeit
2. Professionelle Fotos zu Publikationszwecken.
3. Handhaben des Rohres inkl. Biegen mit der Biegemaschine und Training für die Installation der AVs. Dürfte einen halben Tag in Anspruch nehmen.
4. Liste mit allen relevanten Transferpreisen. Dabei soll dies gleich wie jetzt mit den andern Rohren angebahnt so aufgebaut werden, dass wir Grundkörper und die Anschlussstücke separat einkaufen.
5. Werbegeschenk für Ausstellungen speziell für die Promotion von SEC II.
6. Offizieller Beschluss des Namens für SECON-X II. Vorschlag ist SECON-X II.
7. 10 1 ½ Zoll Muster mit Viertelschnitt. 20 1 ½ Zoll Muster ohne Schnitt für unsere Distributors. 10 2 Zoll Muster ohne Schnitt. Kan variiert werden je nach vorhandenem Material von den UL Versuchen.
8. Vorteile von SEC II und Abgrenzung gegenüber der Konkurrenz.
9. Unterschiede resp. Gleichheiten mit der heutigen SEC.
10. Zielmärkte resp. –kunden für SEC II.
11. Markteinführungsstrategie: Ausstellungen, Broschüren, Promotion (Inserate, Press Releases, Mailings), Distribution, Referenzen. Zeitschiene
12. Wechsel von SEC I auf SEC II, Lager, Austausch.
13. SEC II Datenblatt.
14. SEC II Installationsvorschriften.
15. Ist das 2 ½" Rohr relevant für USA?
16. Bestell- und Lagervorgan für AVs (Körper, NPT und EZ-Fit Anschlusstücke.
17. Value-Engineering der AV um Kosten zu reduzieren (Konkurrenzdruck).
18. Überboden- und Marinaanwendungen – Machbarkeiten, Vorsichten

Andere Diskussionspunkte

1. Nächste Lagerbestellung.
2. Kalifornien SWRCB Kompatibilitätsbestätigungen.
3. Revidierte FSR Installationsvorschrift.
4. Aktueller Wechselkurs Eu/$ und Preise.
5. Bestell- und Lagervorgang für AVs
6. Kürzlich bestellte FSR Tischmuster

April 2010

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Supersedes
DIN EN 14214:2009-02

Automotive fuels – Fatty acid methyl esters (FAME) for diesel engines – Requirements and test methods (includes Amendment A1:2009) English translation of DIN EN 14214:2010-04

Kraftstoffe für Kraftfahrzeuge –
Fettsäure-Methylester (FAME) für Dieselmotoren –
Anforderungen und Prüfverfahren (enthält Änderung A1:2009)
Englische Übersetzung von DIN EN 14214:2010-04

Carburants pour automobiles –
Esters méthyliques d'acides gras (EMAG) pour moteurs diesel –
Exigences et méthodes d'essai (Amendement A1:2009 inclus)
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In case of doubt, the German-language original shall be considered authoritative.

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A comma is used as the decimal marker.

National foreword

This standard has been prepared by Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin” (Secretariat: NEN, Netherlands) with intensive German participation.

The responsible German body involved in its preparation was the *Normenausschuss Materialprüfung* (Materials Testing Standards Committee), Working Committee NA 062-06-32-01 UA *Prüfung von FAME* of the *Fachausschuss Mineralöl- und Brennstoffnormung* (FAM).

The DIN Standards corresponding to the International Standards referred to in this document are as follows:

EN ISO 3170 DIN EN ISO 3170, DIN 51750-1 and DIN 51750-2

Amendments

This standard differs from DIN EN 14214:2009-02 as follows:

a) Clause 2 “Normative references” has been updated and EN 15779 has been added.

b) In subclause 5.3 “Stabilizing agents”, the term “long term stability” has been replaced by “oxidation stability”.

c) In Table 1, EN 15779 for the determination of polyunsaturated methyl esters has been added.

d) In Table 1, a note has been included concerning the determination of the total contamination to clarify that when applied to FAME, the test method may show analytical problems.

Previous editions

DIN V 51606: 1994-06
DIN EN 14214: 2003-11, 2009-02
DIN EN 14214 Corrigendum 1: 2004-11
DIN EN 14214 Corrigendum 2: 2008-02

National Annex NA
(informative)

Bibliography

DIN 51750-1:1990-12*, Sampling of petroleum products — General information*

DIN 51750-2:1990-12, *Sampling of liquid petroleum products*

DIN 51773:1996-03, *Determination of ignition quality (cetane number) of diesel fuels using the BASF engine*

BImSchV 10, *Zehnte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über die Beschaffenheit und die Auszeichnung der Qualitäten von Kraftstoffen — 10. BImSchV)* (Tenth ordinance on the implementation of the Federal Immission Control Act (Ordinance on the quality and marking of fuels)) as of 24 June 2004, BGBI (German Federal Law Gazette) I, 2004, No. 30, pp. 1342–1347[1)]

1) Registered in the *DITR database of DIN Software GmbH*, available from: *Beuth Verlag GmbH*, 10772 Berlin.

National Annex NB
(normative)

National specifications concerning clauses 3, 4, 5.5.3 and 5.6.3

NB.1 Sampling

Samples shall be taken in accordance with DIN 51750-1:1990-12 and DIN 51570-2:1990-12.

NB.2 Pump marking

Pump marking shall be as in BImSchV 10 (the Tenth Ordinance on the Implementation of the German Federal Immission Control Act).

NB.3 Climate-related requirements and test methods (see Table 2a)

The following requirements for cold filter plugging points apply:

15 April to 30 September	CFPP max.	0 °C
01 October to 15 November	CFPP max.	−10 °C
16 November to 28 February[2)]	CFPP max.	−20 °C
01 March to 14 April	CFPP max.	−10 °C

NB.4 Determination of cetane number

The method specified in DIN 51773:1996-03 may be used as an alternative method in accordance with 5.6.3 of the present standard; i.e. the BASF engine may be used to determine the cetane number as long as the measured value is corrected to correlate with values obtained using a CFR engine.

2) In leap years 29.02.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14214:2008+A1

November 2009

ICS 75.160.20

Supersedes EN 14214:2008

English Version

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.

CEN members are the national standards bodies of 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.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 14214:2008+A1:2009: E

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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 ‘BIOSTAB’ 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.

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.

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)*

▌A1⟩ EN 15751:2009 ⟨A1▌, *Automotive fuels — Fatty acid methyl ester (FAME) fuel and blends with diesel fuel — Determination of oxidation stability by accelerated oxidation method*

〈A1〉 EN 15779:2009, *Petroleum products and fats 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* 〈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.

5.4.5 FAME fuel shall be free from any adulterant or contaminant that may render the fuel unacceptable for use in diesel engine vehicles.

A1

Table 1 — Generally applicable requirements and test methods

Property	Unit	Limits		Test method [a] (See Clause 2)
		minimum	maximum	
FAME content [a]	% (*m/m*)	96,5 [b]	–	EN 14103
Density at 15 °C [c]	kg/m^3	860	900	EN ISO 3675 EN ISO 12185
Viscosity at 40 °C [d]	mm^2/s	3,50	5,00	EN ISO 3104
Flash point	°C	101	–	EN ISO 2719 [e] EN ISO 3679 [f]
Sulfur content	mg/kg	–	10,0	EN ISO 20846 EN ISO 20884
Carbon residue (on 10 % distillation residue) [g]	% (*m/m*)	–	0,30	EN ISO 10370
Cetane number [h]	–	51,0	–	EN ISO 5165
Sulfated ash content	% (*m/m*)	–	0,02	ISO 3987
Water content	mg/kg	–	500	EN ISO 12937
Total contamination	mg/kg	–	24	EN 12662 [i]
Copper strip corrosion (3 h at 50 °C)	rating	class 1		EN ISO 2160
Oxidation stability, 110 °C	hours	6,0	–	EN 15751 [j] EN 14112
Acid value	mg KOH/g	–	0,50	EN 14104
Iodine value	g iodine/100 g	–	120	EN 14111
Linolenic acid methyl ester	% (*m/m*)	–	12,0	EN 14103
Polyunsaturated (≥ 4 double bonds) methyl esters	% (*m/m*)	–	1,00	EN 15779
Methanol content	% (*m/m*)	–	0,20	EN 14110
Monoglyceride content	% (*m/m*)	–	0,80	EN 14105
Diglyceride content	% (*m/m*)	–	0,20	EN 14105
Triglyceride content [a]	% (*m/m*)	–	0,20	EN 14105
Free glycerol	% (*m/m*)	–	0,02	EN 14105 [j] EN 14106
Total glycerol	% (*m/m*)	–	0,25	EN 14105
Group I metals (Na+K) Group II metals (Ca+Mg)	mg/kg mg/kg	–	5,0 5,0	EN 14108 [k] EN 14109 EN 14538 EN 14538

Table 1 *(continued)*

Phosphorus content	mg/kg	–	4,0	EN 14107

[a] See 5.6.1.
[b] The addition of non-FAME components other than additives is not allowed, see 5.2. When C17-methyl esters naturally appear in FAME this can result in a lower measured fatty acid methyl ester content. In this situation reference should be made for verification to a modified determination procedure [3], until a modified method is established within CEN.
[c] Density may be measured over a range of temperatures from 20 °C to 60 °C. Temperature correction shall be made according to the formula given in Annex C. See also 5.6.2.
[d] If CFPP is -20 °C or lower, the viscosity shall be measured at -20 °C. The measured value shall not exceed 48 mm^2/s. In this case, EN ISO 3104 is applicable without the precision data owing to non-Newtonian behaviour in a two-phase system.
[e] Procedure A to be applied. Only a flash point test apparatus equipped with a suitable detection device (thermal or ionization detection) shall be used. See also 5.6.2.
[f] A 2 ml sample and apparatus equipped with a thermal detection device shall be used.
[g] ASTM D 1160 shall be used to obtain the 10 % distillation residue. See also 5.4.4.
[h] See 5.6.3.
[i] The test method developed for diesel fuel may show analytical problems when applied to FAME. A test method more suitable for arbitration in disputes is under development by CEN.
[j] See 5.6.2.
[k] See 5.6.2. See Annex A for precision data for sum of Na + K.

〈A1〉

5.5 Climate dependent requirements and related test methods

5.5.1 For climate-dependent requirements options are given to allow for seasonal grades to be set nationally. The options are for temperate climates six CFPP (cold filter plugging point) grades and for arctic climates five different classes. Climate-dependent requirements are given in Table 2. Table 2 is divided into two sections, one for temperate climates (Table 2a) and one for arctic climates (Table 2b). When tested by the methods given in the Tables 2a and 2b, FAME "as fuel for diesel engines" shall be in accordance with the limits specified in these tables.

5.5.2 The climate-dependent requirements in Table 2 do not apply for FAME being used as a blend component in EN 590 diesel fuel.

NOTE A requirement for FAME to meet the climate-dependent requirements could result in incompatibility between the cold flow additives used in the FAME and the diesel fuel. This may compromise the performance of the finished diesel/FAME blend in respect of its low temperature operability and cause field failures as result of filter plugging in cold weather. Cold flow additives should be specifically matched to the base diesel fuel and FAME quality to ensure correct performance consistent with the requirements set out in EN 590. The choice of cold flow additive technology should be a contractual matter between the fuel blender and the biodiesel supplier taking into account the climatic-dependent requirements of the finished diesel fuel.

5.5.3 In a national annex to this European Standard each country shall detail requirements for a summer and a winter grade and may include (an) intermediate and/or regional grade(s) which shall be justified by national meteorological data.

Table 2 — Climate-related requirements and test methods

Table 2a — Temperate climates

Property	Unit	Limits						Test method [a]
		Grade A	Grade B	Grade C	Grade D	Grade E	Grade F	
CFPP	°C, max.	+5	0	-5	-10	-15	-20	EN 116

[a] See also 5.6.1.

Table 2b — Arctic climates

Property	Units	Limits					Test method [a]
		class 0	class 1	class 2	class 3	class 4	
CFPP	°C, max.	-20	-26	-32	-38	-44	EN 116

[a] See also 5.6.1.

5.6 Precision and dispute

5.6.1 All test methods referred to in this European Standard include a precision statement according to EN ISO 4259. In cases of dispute, the procedures described in EN ISO 4259 shall be used for resolving the dispute, and interpretation of the results based on the test method precision shall be used.

However, the methods currently available for FAME content and triglyceride content, do not meet the 2R requirement of EN ISO 4259 at the limit in Table 1. At the moment revised methods are under development in a joint effort by CEN/TC 19 and CEN/TC 307.

5.6.2 In cases of dispute concerning density, EN ISO 3675 shall be used with the determination carried out at 15 °C.

In cases of dispute concerning flash point, EN ISO 3679 shall be used.

In cases of dispute concerning oxidation stability, ⟨A1⟩ EN 15751 ⟨A1⟩ shall be used.

In cases of dispute concerning free glycerol, EN 14105 shall be used.

In cases of dispute concerning metal content, EN 14538 shall be used, as EN 14108 and EN 14109 do not meet the 2R requirements of EN ISO 4259 at the limit in Table 1.

5.6.3 For the determination of cetane number alternative methods may also be used in cases of dispute, provided that these methods originate from a recognized method series, and have a valid precision statement, derived in accordance with EN ISO 4259, which demonstrates precision at least equal to that of the referenced method. The test result, when using an alternative method, shall also have a demonstrable relationship to the result obtained when using the reference method.

Annex A
(normative)

Details of interlaboratory test programme

The precision data given in Table A.1 apply in the case of FAME, as far as not already indicated in the standard. In Table A.1 only those data for requirements from standardized test methods that differ from ISO/TC 28 or ASTM precision data are given. More details are available in the interlaboratory test report [A1] [4] [A1].

Table A.1 — Precision data from interlaboratory test programme

Property	Test method	Unit	CEN/TC 19 data for pure FAME
Viscosity at 40 °C	EN ISO 3104	mm^2/s	r = 0,001 1 X R = 0,018 X
Flash point	EN ISO 2719	°C	r = 2,4 R = 11,4
	EN ISO 3679		r = 2,1 R = 11,1
Sulfur content	EN ISO 20846	mg/kg	r = 0,028 5 X + 2 R = 0,108 8 X + 2
	EN ISO 20884		r = 0,026 X + 1,356 R = 0,056 7 X + 1,616
Distillation	ASTM D 1160	°C	r = 2,0 R = 3,0 (90 % distilled)
Cetane number	EN ISO 5165		r = 2,4 R = 5,0
Sulfated ash content	ISO 3987	%(m/m)	$r = 0,06\ X^{0,85}$ $R = 0,142\ X^{0,85}$
CFPP	EN 116	°C	not available
Sum of Na + K	EN 14108 EN 14109	mg/kg	r = -0,017 X + 0,512 R = 0,305 X + 1,980

where

r repeatability (EN ISO 4259);

R reproducibility (EN ISO 4259);

X mean of two results being compared.

Annex B
(normative)

Calculation of Iodine Value

B.1 General

NOTE This method is adapted for biodiesel from the AOCS recommended practice Cd 1c – 85 for the determination of the iodine value of edible oil from its fatty acid composition [5].

B.2 Scope

This method describes a procedure for calculating the iodine value of neat biodiesel or biodiesel extracted from blends with diesel fuel. In case of dispute on the iodine value this method shall not be used as a substitute for EN 14111.

B.3 Principle

This method is used to calculate the iodine value expressed in g I_2 /100 g sample from the percentage by mass of methyl esters as determined by either EN 14103 (neat biodiesel) or EN 14331 [2] (biodiesel extracted from blends with diesel fuel).

B.4 Procedure

The methyl ester composition of the sample is checked using the appropriate method as described in 5.4.

NOTE The total methyl esters thus revealed should equal 100 after the deduction of the methyl ester C17 used for internal standard in EN 14103.

The percentage by mass thus obtained is then used to calculate the sample's iodine value, being the sum of the individual contributions of each methyl ester, obtained by multiplying the methyl ester percentage by its respective factor (Table B.1), as indicated in the example in Table B.2.

The factor for each constituent of biodiesel is given in Table B.1.

Table B.1 — Methyl ester factors

Methyl ester	Factor
Methyl ester of saturated fatty acids	0
Methyl hexadecenoate (Methyl palmitoleate) C16:1	0,950
Methyl octadecenoate (Methyl oleate) C18:1	0,860
Methyl octadecadienoate (Methyl linoleate) C18:2	1,732
Methyl octadecatrienoate (Methyl linoleate) C18:3	2,616
Methyl eicosenoate C20:1	0,785
Methyl docasenoate (Methyl erucate) C22:1	0,723

An example of the calculation of iodine value from the percentage by mass of methyl esters is given in Table B.2.

Table B.2 — Calculation example

Methyl ester of the following acids	Percentage % m/m	Factor	Contribution
Myristic C14:0	0,3	0	0
Palmitic C16:0	4,0	0	0
Palmitoleic C16:1	1,1	0,950	1,0
Stearic C18:0	2,0	0	0
Oleic C18:1	60,5	0,860	52,0
Linoleic C18:2	19,8	1,732	34,3
Linolenic C18:3	9,4	2,616	24,6
Eicosanoic C20:0	0,4	0	0
Eicosenoic C20:1	0,7	0,785	0,6
Docosanoic C22:0	0,7	0	0
Docosenoic C22:1	1,1	0,723	0,8
		Calculated Iodine Value	113,3

B.5 Expression of the result

The iodine value, as calculated from the methyl ester composition, shall be expressed in g iodine /100 g. The result shall be reported to one decimal place.

NOTE 1 In 1994 the AOCS Uniform Methods Committee reviewed the coefficients used and concluded that no changes were necessary at that time. The present procedure uses the coefficients selected in the past for use in calculating the iodine value in triglyceride blends. The reasoning behind that choice is that triple the molecular weight of a methyl ester is almost identical to the molecular weight of the corresponding triglyceride.

NOTE 2 For samples with unsaponifiable content greater than 0,5 % (*m/m*) or those containing a significant additive content, the calculated value tends to be higher than the true value.

NOTE 3 The calculated result tends to be lower than the true value in samples with a lower iodine value.

Annex C
(normative)

Correction factor for calculation of density of FAME

The conversion factor for the correction of density, determined by EN ISO 3675 over a range of temperatures from 20 °C to 60 °C, to density at 15 °C is based on data published at the International Conference on Standardization and Analysis of Biodiesel, Vienna, November 1995 [6].

NOTE At the moment a DIN investigation is generating additional data.

The density of seven samples of FAME was measured by pyknometer at 6 temperatures over the range 20 °C to 60 °C. The mean correction factor over the range was calculated as 0,723 kg/(m^3 °C), with a standard deviation of 1,2 %. The average density of the FAME samples at 15 °C was calculated as 886,5 kg/m^3.

The following equation shall be used for the calculation of density of FAME at 15 °C ($\rho_{(15)}$, given in kg/m^3), using the density ($\rho_{(T)}$) at a certain temperature (T), determined by EN ISO 3675 over the range of temperatures from 20 °C to 60 °C:

$$\rho_{(15)} = \rho_{(T)} + 0{,}723(T - 15) \qquad \text{(C.1)}$$

Bibliography

[1] CEN/TR 15367-1, *Petroleum products — Guide for good housekeeping — Part 1: Automotive diesel fuels*

[2] EN 14331, *Liquid petroleum products — Separation and characterisation of fatty acid methyl esters (FAME) from middle distillates — Liquid chromatography (LC)/gas chromatography (GC) method*

〉A1〈 *deleted text* 〉A1〈

[3] S. Schober, I. Seidl and M. Mittelbach, *Ester content evaluation in biodiesel from animal fats and lauric oils*, Eur. J. Lipid Sci. Technol. 108 (2006) 309–314

[4] CEN/TR 15160:2005, *Petroleum and related products — Applicability of diesel fuel test methods for Fatty Acid Methyl Esters (FAME) — Information and results on round robin tests*

[5] *The Official Methods and Recommended Practices of the AOCS*, 5th edition, 1998, Champaign, IL, USA.

[6] J. Rathbauer & A. Bachler, *Physical Properties of Vegetable Oil Methyl Esters*, International Conference on Standardization and Analysis of Biodiesel, November 6th – 7th, 1995, Vienna.