SLOVENSKI STANDARD
SIST EN 14213:2003

01-november-2003

Kurilno olje ï Metil estri maġļ obne kisline (FAME) ï Zahteve in preskusne metode

Heating fuels - Fatty acid methyl esters (FAME) - Requirements and test methods

Heizöle - Fettsäure-Methylester (FAME) - Anforderungen und Prüfverfahren

Fuel domestique - Esters méthyliques d'acides gras (EMAG) - Exigences et méthodes d'essais

Ta slovenski standard je istoveten z: EN 14213:2003

ICS:

75.160.20 Tekoļ a goriva Liquid fuels

SIST EN 14213:2003 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14213

July 2003

ICS 75.160.20

English version

Heating fuels - Fatty acid methyl esters (FAME) - Requirements and test methods

Fuel domestique - Esters méthyliques d'acides gras (EMAG) - Exigences et méthodes d'essais

Heizöle - Fettsäure - Methylester (FAME) - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 13 February 2003.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 14213:2003 E

Contents

Foreword

This document EN 14213:2003 has been prepared by Technical Committee CEN/TC 19 “Petroleum products, lubricants and related products”, 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of an identical text or by endorsement, at the latest by January 2004, and conflicting national standards shall be withdrawn at the latest by January 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

Many of the test methods included in this standard were the subject of interlaboratory testing to determine the applicability of the method and its precision in relation to different sources of fatty acid methyl esters. These fatty acid methyl esters were produced from rapeseed and sunflower oil.

This standard gives all relevant characteristics, requirements and test methods for FAME, which are known at this time to be necessary to define the product to be used as fuel for heating or as a blending component for the production of heating fuel, including iodine value. The question of product stability, i.e. thermal and storage stability as well as biovulnerability, are of great concern for the practical use of FAME as heating fuel. At this time no suitable test methods and limits can be proposed for the different types of stability.

The stability characteristics of FAME are under investigation in an EU-funded research programme ‘BIOSTAB’, and suitable limits and test methods may be incorporated into an amended version of this standard upon successful conclusion of this programme, including a possible replacement for iodine value.

If this specification is used for FAME as a blending component in blends of FAME with mineral oil based heating fuels, the resulting blends should meet the requirements of the national standards for heating fuel in the countries applying this standard.

Annex A is normative and contains the precision data generated on the test methods which are the result of the interlaboratory testing as mentioned above, carried out by working groups of CEN/TC 19. Annex B, also normative, contains details on the calculation of density.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements and test methods for marketed and delivered fatty acid methyl esters (FAME) to be used either as a heating fuel at 100% concentration, or as a blending component for the production of heating fuel. At 100% concentration it is applicable to fuel for use in heating equipment designed or subsequently adapted to run on 100% FAME.

NOTE For the purposes of this European Standard, the term "% (*m/m*)" is used to represent the mass fraction.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

EN 12662:1998, *Liquid petroleum products - Determination of contamination in middle distillates.*

EN 14103:2003[1)] *, Fat and oil derivatives - Fatty Acid Methyl Esters (FAME) – Determination of ester and linolenic acid methyl ester contents*

EN 14104:2003[1)], *Fat and oil derivatives – Fatty Acid Methyl Esters (FAME) - Determination of acid value*

EN 14105:2003[1)], *Fat and oil derivatives – Fatty Acid Methyl Esters (FAME) – Determination of free and total glycerol and mono-, di- and triglyceride contents (Reference method)*

EN 14106:2003[1)], *Fat and oil derivatives – Fatty Acid Methyl Esters (FAME)– Determination of free glycerol content*

EN 14111:2003[1)], *Fat and oil derivatives – Fatty Acid Methyl Esters (FAME) – Determination of iodine value*

EN 14112:2003[1)], *Fat and oil derivatives - Fatty Acid Methyl Esters (FAME) - Determination of oxidation stability (accelerated oxidation test).*

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

EN ISO 3104:1996/AC:1999, *Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104:1994, Cor. 1:1997).*

EN ISO 3170[2)] *Petroleum liquids – Manual sampling.*

EN ISO 3171:1988, *Petroleum liquids – Automatic pipeline sampling (ISO 3171:1988).*

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

---

1) To be published

2) To be published (revision of EN ISO 3170:1995)

prEN ISO 3679:2002[3], *Determination of flash point - Rapid equilibrium closed cup method (ISO/DIS 3679:2002).*

EN ISO 4259:1995, *Petroleum products - Determination and application of precision data in relation to methods of test (ISO 4259:1992/Cor. 1:1993).*

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

EN ISO 12185:1996/C1:2001, *Crude petroleum and petroleum products - Determination of density - Oscillating U-tube method (ISO 12185:1996/Cor. 1:2001)*.

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

prEN ISO 20846:2002, *Petroleum products – Determination of the sulfur content of automotive fuels - Energy-dispersive X-ray fluorescence spectrometry (ISO/DIS 20846:2002).*

prEN ISO 20884:2002, *Petroleum products – Determination of low sulfur content of automotive fuels – Wavelength-dispersive X-ray fluorescence spectrometry (ISO/DIS 20884:2002).*

ISO 3016:1994, *Petroleum products - Determination of pour point.*

ISO 3105:1994, *Glass capillary kinematic viscometers - Specifications and operating instructions.*

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

DIN 51900:1989, *Determination of gross calorific value of solid and liquid fuels by the bomb calorimeter and calculation of net calorific value – General information.*

DIN 51900-1:1998, *Testing of solid and liquid fuels – Determination of gross calorific value by the bomb calorimeter and calculation of net calorific value – Part 1: Principles, apparatus, methods.*

DIN 51900-2:1977, *Testing of solid and liquid fuels –Determination of gross calorific value by the bomb calorimeter and calculation of net calorific value – Part 2: Method using isoperibol or static jacket calorimeter.*

DIN 51900-3:1977, *Testing of solid and liquid fuels –Determination of gross calorific value by the bomb calorimeter and calculation of net calorific value; Method using adiabatic jacket.*

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 heating 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.

[3] Revision of ISO 3679:1983

4 Requirements and test methods

4.1 Dyes and markers

The use of dyes or markers is allowed.

4.2 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 combustion efficiency and emissions control durability. Other technical means with equivalent effect may also be used.

4.3 Generally applicable requirements and related test methods

4.3.1 When tested by the methods indicated in Table 1, fatty acid methyl esters (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 fatty acid methyl esters 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.

4.3.2 In case of a need for identification of FAME, a recommended method based on separation and characterisation of fatty acid methyl esters by LC/GC is EN 14331 [1].

4.4 Precision and dispute

4.4.1 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 total contamination, ester content, triglyceride content and free glycerol do not meet the 2R requirement of EN ISO 4259 at the limit in Table 1.

4.4.2 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 free glycerol, EN 14105 shall be used.

Table 1 - Generally applicable requirements and test methods

Property	Unit	Limits		Test method [a]
		minimum	maximum	
Ester 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	mm^2/s	3,5	5,0	EN ISO 3104 ISO 3105
Flash point	°C	120	–	prEN ISO 3679 [d]
Sulfur content	mg/kg	–	10,0	prEN ISO 20846 prEN ISO 20884
Carbon residue (on 10 % distillation residue) [e]	% (m/m)	–	0,30	EN ISO 10370
Sulfated ash content	% (m/m)	–	0,02	ISO 3987
Water content	mg/kg	–	500	EN ISO 12937
Total contamination [f]	mg/kg	–	24	EN 12662
Oxidation stability, 110 °C [f]	hours	4,0	–	EN 14112
Acid value	mg KOH/g		0,50	EN 14104
Iodine value [g]	gr iodine/100 gr		130	EN 14111
Polyunsaturated (>= 4 double bonds) methyl esters [h]	% (m/m)		1	
Monoglyceride content	% (m/m)		0,80	EN 14105
Diglyceride content	% (m/m)		0,20	EN 14105
Triglyceride content	% (m/m)		0,20	EN 14105
Free glycerol	% (m/m)		0,02	EN 14105 EN 14106
Cold filter plugging point (CFPP) [i]	°C		[j]	EN 116
Pour point [k]	°C		0	ISO 3016
Net calorific value (calculated)	MJ/kg	35		DIN 51900 DIN 51900-1 DIN 51900-2 DIN 51900-3

[a] See also 4.4.1
[b] The addition of non-FAME components other than additives is not allowed, see 4.2.
[c] Density may be measured by EN ISO 3675 over a range of temperatures from 20 °C to 60 °C. Temperature correction shall be made according to the formula given in Annex B. See also 4.4.2
[d] A 2 ml sample and apparatus equipped with a thermal detection device shall be used
[e] ASTM D 1160 shall be used to obtain the 10% distillation residue
[f] Pending development of a suitable method by CEN/TC 19, EN 12662 shall be used. The precision of EN 12662 is however poor for FAME products
[g] See Foreword, last but three and last but two paragraphs
[h] Suitable test method to be developed
[i] Only for FAME intended to be used as heating fuel solely, the same limit as for mineral oil is required according to national regulations
[j] See Foreword, last but one paragraph
[k] Free of additives for cold flow improvement or cloud point depressing; only for blending purposes