



SLOVENSKI STANDARD SIST EN 590:2009+A1:2010

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Goriva za motorna vozila - Dizelsko gorivo - Zahteve in preskusne metode

Automotive fuels - Diesel - Requirements and test methods

Kraftstoffe für Kraftfahrzeuge - Dieseldieselkraftstoff - Anforderungen und Prüfverfahren

Carburants pour automobiles - Carburants pour moteur diesel (gazole) - Exigences et méthodes d'essai

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EUROPEAN STANDARD

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Automotive fuels - Diesel - Requirements and test methodsCarburants pour automobiles - Carburants pour moteur
diesel (gazole) - Exigences et méthodes d'essaiKraftstoffe für Kraftfahrzeuge - Dieseldieselkraftstoff -
Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 12 March 2009 and includes Amendment 1 approved by CEN on 28 December 2009.

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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.

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Foreword

This document (EN 590:2009+A1:2010) 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of an identical text or by endorsement, at the latest by August 2010, and conflicting national standards shall be withdrawn at the latest by August 2010.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 2009-12-28.

This document supersedes $\boxed{A_1}$ EN 590:2009 $\boxed{A_1}$.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\boxed{A_1}$.

This document has been prepared as part of a mandate given to CEN by the European Commission and the European Free Trade Association. It stipulates the first step towards fulfilling that mandate, i.e. to reflect the different characteristics of FAME blended up to 10 % (V/V) in diesel compared to pure hydrocarbon diesel.

The requirements of the European Fuels Directive 98/70/EC [1], including amendment 2003/17/EC [2] $\boxed{A_1}$ and Amendment 2009/30/EC [8] $\boxed{A_1}$ have been included. Table 1 explicitly differentiates between requirements included in the European Fuels Directive 98/70/EC [1], including Amendment 2003/17/EC [2] $\boxed{A_1}$ and Amendment 2009/30/EC [8] $\boxed{A_1}$, and other requirements. Dates are included with all normative test method references in order to comply with the requirements of the European Commission, with the accompanying assurance that updated versions will always give similar accuracy and the same or better precision.

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

- a) Provision is made for a maximum of 7 % (V/V) of fatty acid methyl esters (FAME) to be included in automotive diesel fuel.
- b) Inclusion of the revised EN 14214 FAME specification.
- c) Clarification of the fact that cold flow requirements of FAME when used as an extender for diesel according to this specification (as set out in Table 2 of EN 14214:2008) do not apply.
- d) Addition of the Ignition Quality Tester as an alternate test method to the CFR engine test.
- e) Deletion of the 350 mg/kg sulfur content, which was only allowed until 2005 $\boxed{A_1}$, and of the 50 mg/kg level which was allowed until 2009 $\boxed{A_1}$.
- f) Inclusion of the revised total contamination test method EN 12662, which in itself is again under revision to improve precision for FAME containing product following new interlaboratory studies.
- g) Inclusion of the revised EN 12916, which is now able to distinguish between polycyclic aromatic hydrocarbons and fatty acid methyl esters (FAME) due to the deletion of the back-flush step.
- h) Inclusion of an additional requirement and method (EN 15751) to determine the oxidation stability, with a limit of 20h.
- i) Addition of a workmanship clause 5.4.3 and a note referring to good house keeping via CEN/TR 15367-1. $\boxed{A_1}$
- j) Lowering of the maximum level of polycyclic aromatic hydrocarbons from 11 % (m/m) to 8,0 % (m/m). $\boxed{A_1}$

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- k) A general update of the revised test methods, some of them already having been included in the Technical Corrigendum to the previous version.

Annex A is normative and contains the precision data generated on the test methods which are the result of inter-laboratory testing, carried out by working groups of CEN/TC 19. Many of the test methods included in this standard were the subject of inter-laboratory testing to determine the applicability of the method and its precision in relation to blends of automotive diesel fuel containing 5 % (V/V) or higher of different sources of fatty acid methyl esters (FAME), a.o. rape seed and sunflower oil.

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, Croatia, 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 the United Kingdom.

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1 Scope

This European Standard specifies requirements and test methods for marketed and delivered automotive diesel fuel. It is applicable to automotive diesel fuel for use in diesel engine vehicles designed to run on automotive diesel fuel.

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 12662:2008, *Liquid petroleum products — Determination of contamination in middle distillates*

EN 12916:2006, *Petroleum products — Determination of aromatic hydrocarbon types in middle distillates — High performance liquid chromatography method with refractive index detection*

EN 14078:2009, *Liquid petroleum products — Determination of fatty methyl ester (FAME) content in middle distillates — Infrared spectrometry method*

EN 14214:2008, *Automotive fuels — Fatty acid methyl esters (FAME) for diesel engines — Requirements and test methods*

EN 15195:2007, *Liquid petroleum products — Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels by combustion in a constant volume chamber*

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

EN 23015:1994, *Petroleum products — Determination of cloud point (ISO 3015:1992)*

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 3405:2000, *Petroleum products — Determination of distillation characteristics at atmospheric pressure (ISO 3405:2000)*

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

EN ISO 4259:2006, *Petroleum products — Determination and application of precision data in relation to methods of test (ISO 4259:2006)*

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EN ISO 4264:2007, *Petroleum products — Calculation of cetane index of middle-distillate fuels by the four-variable equation (ISO 4264:2007)*

EN ISO 5165:1998, *Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method (ISO 5165:1998)*

EN ISO 6245:2002, *Petroleum products — Determination of ash (ISO 6245:2001)*

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

EN ISO 12156-1:2006, *Diesel fuel — Assessment of lubricity using the high-frequency reciprocating rig (HFRR) — Part 1: Test method (ISO 12156-1:2006)*

EN ISO 12185:1996, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method (ISO 12185:1996)*

EN ISO 12205:1996, *Petroleum products — Determination of the oxidation stability of middle-distillate fuels (ISO 12205:1995)*

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)*

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EN ISO 20884:2004 *Petroleum products — Determination of sulfur content of automotive fuels — Wavelength-dispersive X-ray fluorescence spectrometry (ISO 20884:2004)*

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 detail or shall be referred to by reference in a National Annex to this European Standard.

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 automotive 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.

NOTE It is recommended to set marking for sulfur in a National Annex to this European Standard. The recommended designation for maximum 10 mg/kg sulfur content is “sulfur-free” in national language.

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 Deposit forming tendency test methods suitable for routine control purposes have not yet been identified and developed.

5.3 Fatty acid methyl ester (FAME)

Diesel fuel may contain up to 7 % (V/V) of FAME complying with EN 14214, in which case the climate-dependent requirements set out in 5.4 of EN 14214:2008 do not apply. The finished blend of diesel fuel shall however comply with the climate dependent requirements set out in 5.5.

It is strongly recommended to add oxidation stability enhancing additives in the FAME product, at the production stage and before storage, providing an action similar to that obtained with 1 000 mg/kg of 3,5-di-tert-butyl-4-hydroxy-toluol (butylated hydroxyl-toluene, BHT).

NOTE 1 A suitable method for the separation and identification of FAME is given in EN 14331 [3].

NOTE 2 Requiring FAME to meet the climate-dependent requirements set out in EN 14214 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 the 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 this European Standard. 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.

5.4 Generally applicable requirements and related test methods

5.4.1 When tested by the methods indicated in Table 1, automotive diesel fuel shall be in accordance with the limits specified in Table 1. The test methods listed in Table 1 have been assessed for application to automotive diesel containing up to 7 % (V/V) FAME. Precision data from interlaboratory test programmes are given in normative Annex A, where these were found to be different from the precision data given in the test methods for neat petroleum products.

5.4.2 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.

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

NOTE For further information on preventing contamination by water or sediment that may occur in the supply chain, or for cross-contamination, it is advisable to check CEN/TR 15367-1 [4] or -3 [5] respectively.