

# SVENSK STANDARD

## SS-EN 590:2013



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### **Motorbränslen – Diesel – Krav och provningsmetoder**

### **Automotive fuels – Diesel – Requirements and test methods**

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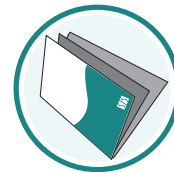
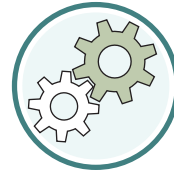
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Europastandarden EN 590:2013 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 590:2013.

Denna standard ersätter SS-EN 590:2009+A1:2010, utgåva 1.

The European Standard EN 590:2013 has the status of a Swedish Standard. This document contains the official English version of EN 590:2013.

This standard supersedes the Swedish Standard SS-EN 590:2009+A1:2010, edition 1.

### **Nationell information**

Standarden innehåller *Bilaga NA (normativ) Nationella krav på pumpmärkning samt klimatbetingade krav*

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EUROPEAN STANDARD

**EN 590**

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2013

ICS 75.160.20

Supersedes EN 590:2009+A1:2010

English Version

## Automotive fuels - Diesel - Requirements and test methods

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

Kraftstoffe für Kraftfahrzeuge - Dieseldieseldieselkraftstoff -  
Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 26 July 2013.

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

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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 590:2013) 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 March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.

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 supersedes EN 590:2009+A1:2010.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association [5]

The requirements of the European Fuels Directive 98/70/EC [1], including amendments 2003/17/EC [2], 2009/30/EC [3] and 2011/63/EC [4], have been included. Dates are included with all normative test method references in order to comply with the requirements of the European Commission; with the accompanying assurance by CEN/TC 19 that any referenced updated versions will always give similar accuracy and the same or better precision (see [4]).

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

- Inclusion of the revised EN 14214 FAME specification.
- Specific requirements concerning the limitation of use of methylcyclopentadienyl manganese tricarbonyl (MMT) as required by the EC have been incorporated.
- Addition of the Fuel Ignition Tester (EN 16144) as an alternate test method to the CFR engine test.
- Addition of Simulated Distillation by gas chromatography (GC), EN ISO 3924, as an alternate test method to distillation by EN ISO 3405.
- Introduction of the improved EDXRF determination technique for low sulfur contents, EN ISO 13032, in replacement of EN ISO 20847.

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 10 % (V/V) or higher of different sources of fatty acid methyl esters (FAME).

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 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 containing up to 7,0 % (V/V) Fatty Acid Methyl Ester.

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 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.

EN 116:1997<sup>1)</sup>, *Diesel and domestic heating fuels - Determination of cold filter plugging point*

prEN 12662:2012<sup>2)</sup>, *Liquid petroleum products - Determination of total contamination in middle distillates, diesel fuels and fatty acid methyl esters*

EN 12916:2006<sup>1)</sup>, *Petroleum products - Determination of aromatic hydrocarbon types in middle distillates - High performance liquid chromatography method with refractive index detection*

EN 14078:2009<sup>1)</sup>, *Liquid petroleum products - Determination of fatty acid methyl ester (FAME) content in middle distillates - Infrared spectrometry method*

EN 14214:2012<sup>3)</sup>, *Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods*

EN 15195:2007<sup>1)</sup>, *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<sup>1)</sup>, *Automotive fuels - Fatty acid methyl ester (FAME) fuel and blends with diesel fuel - Determination of oxidation stability by accelerated oxidation method*

EN 16144:2012, *Liquid petroleum products - Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels - Fixed range injection period, constant volume combustion chamber method*

EN 16329:2013, *Diesel and domestic heating fuels - Determination of cold filter plugging point - Linear cooling bath method*

prEN 16576:2013<sup>2)</sup>, *Automotive fuels - Determination of manganese and iron content in middle distillate fuels - Inductively coupled plasma optical emission spectrometry (ICP OES) 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)*

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1) Under revision.

2) In preparation.

3) This document is currently impacted by EN 14214:2012/FprA1:2013.



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<sup>1)</sup>, *Petroleum liquids - Automatic pipeline sampling (ISO 3171:1988)*

EN ISO 3405:2011, *Petroleum products - Determination of distillation characteristics at atmospheric pressure (ISO 3405:2011)*

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

EN ISO 3924:2010, *Petroleum products - Determination of boiling range distribution - Gas chromatography method (ISO 3924:2010)*

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

EN ISO 4264:2007<sup>4)</sup>, *Petroleum products - Calculation of cetane index of middle-distillate fuels by the four-variable equation (ISO 4264:2007)*

EN ISO 5165:1998<sup>1)</sup>, *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 13032:2012, *Petroleum products - Determination of low concentration of sulfur in automotive fuels - Energy-dispersive X-ray fluorescence spectrometric method (ISO 13032:2012)*

EN ISO 13759:1996, *Petroleum products - Determination of alkyl nitrate in diesel fuels - Spectrometric method (ISO 13759:1996)*

EN ISO 20846:2011, *Petroleum products - Determination of sulfur content of automotive fuels - Ultraviolet fluorescence method (ISO 20846:2011)*

EN ISO 20884:2011, *Petroleum products - Determination of sulfur content of automotive fuels - Wavelength-dispersive X-ray fluorescence spectrometry (ISO 20884:2011)*

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4) This document is currently impacted by EN ISO 4264:2007/A1:2013.

### **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.

Labelling shall be clearly visible, easily legible and displayed at any point where diesel with metallic additives is made available to consumers. The label shall contain: "Contains metallic additives" in the national language(s) and shall be laid down in the National Annex to this document.

## **5 Requirements and test methods**

### **5.1 Dyes and markers**

The use of dyes or markers is allowed.

### **5.2 Additives**

#### **5.2.1 General**

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.

#### **5.2.2 Methylcyclopentadienyl manganese tricarbonyl (MMT)**

When methylcyclopentadienyl manganese tricarbonyl (MMT) is used, a specific labelling is required (see also Clause 4).

MMT is a metallic additive that can be used in diesel. The presence of the MMT in diesel shall be limited to 6 mg of manganese per litre from 1 January 2011. The limit shall be 2 mg of manganese per litre from 1 January 2014.

NOTE These requirements are subject to review following an assessment by the European Commission.

### **5.3 Fatty acid methyl ester (FAME)**

Diesel fuel may contain up to 7,0 % (V/V) of FAME complying with EN 14214:2012, in which case the climate-dependent requirements set out in 5.4.2 of EN 14214:2012 do not apply.

NOTE 1 A suitable method for the separation and identification of FAME is given in EN 14331 [6].

Climate dependent requirements for FAME as a blending component for use in diesel fuel according to this document are set out in 5.4.3 of EN 14214:2012. The specific grades shall be specified on a national basis according to local climatic conditions and the FAME volume in the diesel fuel.

The finished blend of diesel fuel shall also comply with the climate dependent requirements set out in 5.6. of this document.

Cold flow additives, when used in FAME, 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 could result in incompatibility between the cold flow additives used in the FAME and the diesel fuel. The choice of cold flow additive technology should be a contractual matter between the fuel blender and the FAME supplier taking into account the climatic-dependent requirements of the finished diesel fuel.

NOTE 2 Cold flow requirements for FAME as a blend component in diesel fuel are set out in Tables 3a and 3b and the National Annex of EN 14214:2012, in order to control maximum content of saturated monoglycerides in the final EN 590 blend to ensure trouble-free operation. Work is on-going to identify a suitable test method for saturated monoglycerides or a performance test to control this aspect of low temperature performance.

In order to improve the oxidation stability of FAME, it is strongly recommended to add oxidation stability enhancing additives to FAME at the production stage and before storage, providing an oxidation stability similar to that obtained with 1 000 mg/kg of 2,6-di-tert-butyl-4-hydroxytoluene (BHT, officially designated by IUPAC as 2,6-bis(1,1-dimethylethyl)-4-methylphenol).

The similar action may be read as providing oxidation stability performance at least equal to that obtained with 1 000 mg/kg of BHT.

**CAUTION — There is a potential risk of precipitate formation with oxidation stability enhancing additives at low temperatures in low aromatic arctic fuel. Caution should therefore be taken in the choice of oxidation stability enhancing additives to arctic grade FAME.**

## 5.4 Other (bio-) components

Limits for adding FAME are set for technical reasons. Limits for FAME do not apply to other (renewable) hydrocarbons such as Hydrotreated Vegetable Oil (HVO), Gas To Liquid (GTL) or Biomass To Liquid (BTL) derived hydrocarbons, since these paraffinic diesel components are allowed in any proportions provided that the final blend complies with the requirements of EN 590. The use of renewable feedstock at refineries is also allowed provided that the final fuel meets the requirements of EN 590.

NOTE A draft fuel specification for paraffinic diesel fuel has been developed [7].

## 5.5 Generally applicable requirements and related test methods

**5.5.1** 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 FAME. Precision data from inter-laboratory 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.

**5.5.2** 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.

**5.5.3** 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 [8] or CEN/TR 15367-3 [9] respectively.