



# SLOVENSKI STANDARD

## SIST-TS CEN/TS 15940:2012

01-november-2012

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### Goriva za motorna vozila - Parafinsko dizelsko gorivo iz sinteze ali postopka s hidrogeniranjem - Zahteve in preskusne metode

Automotive fuels - Paraffinic diesel fuel from synthesis or hydrotreatment - Requirements and test methods

Kraftstoffe für Kraftfahrzeuge - Paraffinischer Dieselkraftstoff aus Synthese oder Hydrierungsverfahren - Anforderungen und Prüfverfahren

Carburants automobiles - Gazoles paraffiniques de synthèses ou obtenus par hydrotraitement - Exigences et méthodes d'essais

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Ta slovenski standard je istoveten z: **CEN/TS 15940:2012**

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#### **ICS:**

75.160.20      Tekoča goriva      Liquid fuels

**SIST-TS CEN/TS 15940:2012**      **en,de**

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TECHNICAL SPECIFICATION  
SPÉCIFICATION TECHNIQUE  
TECHNISCHE SPEZIFIKATION

**CEN/TS 15940**

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ICS 75.160.20

Supersedes CWA 15940:2009

English Version

**Automotive fuels - Paraffinic diesel fuel from synthesis or  
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Kraftstoffe für Kraftfahrzeuge - Paraffinischer  
Dieselkraftstoff aus Synthese oder Hydrierungsverfahren -  
Anforderungen und Prüfverfahren

This Technical Specification (CEN/TS) was approved by CEN on 9 July 2012 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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## Foreword

This document (CEN/TS 15940:2012) 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.

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 CWA 15940:2009.

In this document all relevant characteristics, requirements and test methods are specified. These specifications are relevant for the driveability of the vehicles and are currently known to prevent harm to the vehicles and their powertrains. National adaptations of this document may choose differently based on local conditions and / or updated knowledge. Climate dependent requirements of this document may vary according to national adoptions of EN 590 and EN 14214, but should be indicated by a specific National Annex.

Significant technical changes between this document and CWA 15940:2009 are:

- a) Provision is made for a maximum of 7 % (V/V) of fatty acid methyl esters (FAME) to be included in paraffinic diesel fuel;
- b) Further precision of the recommended pump marking;
- c) The prevention of cavitation and the protection against seizure are included;
- d) The maximum for cetane number in Class B has been removed as the original gap between 70 and 66 was insufficient distinction from the test method precision perspective, so the middle ground was removed;
- e) PAH's and total olefin requirement have been removed, because these are captured by the total aromatics limit;
- f) Updated test methods have been introduced.

This document is based on current knowledge at the time of publishing, but will require revision when the specification for regular automotive diesel fuel, EN 590, or FAME, EN 14214, has been determined (revised) by CEN/TC 19 or based on further experiences with the use of paraffinic diesel fuel according to this document. Further background can be found in CEN/TR 16389 [3].

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: 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.

## Introduction

This document has been laid down to define a specification for diesel fuel on the basis of synthesis gas (from natural gas, coal or biomass) or of hydrotreated vegetable or animal oils. Its main use is as diesel fuel in dedicated diesel vehicle fleets. Paraffinic diesel fuel does not meet the current diesel fuel specification, EN 590. The main differences between paraffinic diesel fuel and automotive diesel fuel are in the areas of distillation, density, sulfur, aromatics and cetane. Its density can be outside the regular diesel specification, and the described class A type fuel has a higher cetane number.

Paraffinic diesel is a high quality, clean burning fuel with virtually no sulphur and aromatics. Paraffinic diesel fuel can be used in diesel engines (see NOTE 1 under Clause 1), reducing regulated emissions. In order to have the greatest possible emissions reduction, a specific calibration may be necessary. Paraffinic diesel fuel will also offer a meaningful contribution to the target of increased non-petroleum and/or renewable content in transportation fuel pool.

As some production processes result in a fuel containing *cyclo*-paraffins, next to *n*-paraffins and *iso*-paraffins, they show different cetane number compared to other paraffinic diesel fuels. Hence, in this Technical Specification, two classes have been defined, one class showing improved ignition quality compared to regular diesel fuel. Both the normal cetane fuel and the high cetane fuel class are intended for use in dedicated diesel vehicle fleets.

Blending of paraffinic diesel with biodiesel (FAME) is covered in this document. Against the background of the EU Renewable Energy Directive (RED, 2009/28/EC, [1]) and also the latest developments regarding European regular diesel specification, there is now a pressing requirement to allow for FAME blend variations of those paraffinic fuels, which are not already classified as being from renewable resources.

This new activity allows for a paraffinic diesel specification other than CWA 15940, to “mirror” the current EN 590 specification. That is, allowing a blend variant of paraffinic diesel in the same way that CEN diesel quality specifications allow for refinery diesel up to 7% (V/V) FAME blend percentage.

Paraffinic diesel may also be used as a blending component for automotive diesel fuel, but this is also not covered in this document.

The document will be usable on a voluntary basis for engine clearance, fuel acceptance and fuelling station allowance, supporting both local regulations and international trade. In the longer term, further work in this area, including moves towards a more formal standard is envisaged.

## 1 Scope

This Technical Specification describes requirements and test methods for marketed and delivered paraffinic diesel fuel containing up to a level 7 % (V/V) fatty acid methyl ester (FAME), for use in diesel engine vehicles. It defines two classes of paraffinic diesel fuel: high cetane and normal cetane.

Paraffinic diesel fuel originates from synthesis or hydrotreatment processes.

This Technical Specification describes the quality for use as automotive fuel for diesel engines for captive fleets or dedicated vehicle usage. Captive fleets are in general considered as a group of vehicles that possess specific supply logistics, their own dedicated facilities for storage and distribution and adequate maintenance of the vehicles.

NOTE 1 For general diesel engine warranty, paraffinic automotive diesel fuel might need a validation step, which for some existing engines might still need to be done (see also the Introduction to this document).

NOTE 2 For the purposes of this document, 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 590:2009+A1:2010, *Automotive fuels — Diesel — Requirements and test methods*

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

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

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

EN 14214, *Liquid petroleum products — Fatty acid methyl esters (FAME) for use in diesel engines and heating applications — Requirements and test methods*

EN 15195, *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, *Automotive fuels — Fatty acid methyl ester (FAME) fuel and blends with diesel fuel — Determination of oxidation stability by accelerated oxidation method*

EN ISO 2160, *Petroleum products — Corrosiveness to copper — Copper strip test (ISO 2160)*

EN ISO 2719, *Determination of flash point — Pensky-Martens closed cup method (ISO 2719)*

EN ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104)*

EN ISO 3170, *Petroleum liquids — Manual sampling (ISO 3170)*

EN ISO 3171, *Petroleum liquids — Automatic pipeline sampling (ISO 3171)*

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

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

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

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

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

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

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

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

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

EN ISO 12937, *Petroleum products — Determination of water — Coulometric Karl Fischer titration method (ISO 12937)*

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

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

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

SIS 155116, *Petroleum products — Determination of aromatics in diesel fuel — Mono- and dicyclic aromatic compounds and PAH*

### 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 Technical Specification, should it be adopted on a national level.

NOTE Such requirements should be set out in detail or should be referred to by reference by the user of the product or by authorities allowing the product on the market.

In view of the sensitivity of some of the test methods referred to in this document, particular attention shall be paid to compliance with any guidance on sampling containers which is included in the test method standard.

It is essential that for sampling of paraffinic diesel fuel blend the containers used to take and store the samples before test are not contaminated with regular diesel fuel, FAME or sulfur.

### 4 Pump marking

Information to be marked on dispensing pumps used for delivering paraffinic 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 blend.



Such requirements shall be set out in detail or shall be referred to by reference by the user of the product or by authorities allowing the product on the market.

It is strongly recommended to distinguish paraffinic diesel fuel from regular diesel fuel if used at 100 % level by a dedicated marking.

## 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)

Paraffinic diesel fuel may contain up to 7 % (V/V) of FAME complying with EN 14214.

### 5.4 Cavitation prevention

**CAUTION — Fuels with an initial boiling point (IBP) below 160 °C, as determined by EN ISO 3405, may impose a risk of cavitation damage.**

The IBP of paraffinic diesel fuels shall be measured and reported using EN ISO 3405.

NOTE This issue is further being studied by CEN. For additional explanation on the risks see CEN/TR 16389 [3].

### 5.5 Seizure protection

While successful fleet tests using paraffinic diesel fuel have been conducted, there are indications that diesel fuel high in paraffin content does not always protect fuel system components sufficiently against seizure. The lubricity requirement in Table 1 ensures protection against wear but not necessarily also against seizure. Appropriate seizure protection shall be provided by using suitable fuel additives or by blending of minimum 2 % (V/V) of FAME. For further guidance see Annex A.

### 5.6 Generally applicable requirements and related test methods

**5.6.1** When tested by the methods indicated in Table 1, paraffinic diesel fuel blend shall be in accordance with the limits specified in Table 1 for either Class A (high cetane paraffinic diesel fuel) or Class B (normal cetane paraffinic diesel fuel). All values in Table 1 meet the requirements of the European Fuels Directive 98/70/EC [5], including Amendments 2003/17/EC [6] and 2009/30/EC [2].

NOTE For further clarification of the Classes see CEN/TR 16389 [3].