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

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

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

The formal process followed by the Workshop in the development of this Workshop Agreement has been endorsed by the National Members of CEN but neither the National Members of CEN nor the CEN Management Centre can be held accountable for the technical content of this CEN Workshop Agreement or possible conflicts with standards or legislation.

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Foreword

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties on 25 November 2008, the constitution of which was supported by CEN following the public call for participation made on 21 September 2007.

This CEN Workshop Agreement has been prepared by a Workshop, the Secretariat of which is held by the Netherlands Standardization Institute (NEN), with contribution of the following organizations:

Daimler, Germany	PSA Peugeot Citroen, France
Diester Industrie, France	Renault, France
EcoPar, Sweden	Robert Bosch, Germany
ENI Refining & Marketing, Italy	Sasol Chevron, United Kingdom
General Motors Europe, Sweden	Sasol, USA
Iveco, Italy	Shell, United Kingdom
Neste Oil, Finland	Toyota Motor Europe, Belgium
OMV Refining & Marketing, Austria	UOP, United Kingdom
Petrochem Carless, Belgium	Volkswagen, Germany

The final internal review round for this CWA was started on 13 October 2008 and was successfully closed on 11 November 2008. The final draft was submitted to public enquiry using CEN/TC 19 expertise on 1 December 2008 and the overall endorsement of the text being finalised on 26 January 2009. The final text of this CWA was submitted to CEN for publication on 2 February 2009.

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In this edition of CWA 15940:2009 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 power trains. 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.

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This CEN Workshop Agreement is based on current knowledge at the time of publishing, but will require revision when the specification for regular automotive diesel fuel, EN 590, has been determined by CEN/TC 19 or based on further experiences with the use of paraffinic diesel fuel. Comments or suggestions from the users of the CEN Workshop Agreement are welcome and should be addressed to the CEN Management Centre.

Introduction

This CEN Workshop Agreement 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 low density is outside the regular diesel specification, and the described class A type fuel has a higher cetane number.

From an environmental perspective, paraffinic diesel is a high quality, clean burning fuel with virtually no sulphur and aromatics. Paraffinic diesel fuel can be used in existing diesel engines (see NOTE 1 in Clause 1 and the NOTE in Clause 4), substantially 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/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 CEN Workshop Agreement, two classes, showing improved ignition quality compared to regular diesel fuel, have been defined. Both the normal cetane fuel and the high cetane fuel class are intended for use in dedicated diesel vehicle fleets.

Blending with biodiesel (FAME) is not covered in this edition of the CEN Workshop Agreement. If the need arises for blends of FAME with paraffinic diesel fuel a revision process will be considered. Paraffinic diesel may also be used as a blending component for automotive diesel fuel, but this is also not covered in this document.

The CEN Workshop Agreement 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, will depend on whether paraffinic diesel becomes available as a general automotive fuel widely available.

1 Scope

This CEN Workshop Agreement specifies requirements and test methods for marketed and delivered paraffinic diesel fuel. It is applicable to paraffinic diesel fuel from synthesis or hydrotreatment processes for use in diesel engine vehicles designed to run on automotive diesel fuel. The document describes the quality for use as automotive fuel for diesel engines at 100 % concentration.

NOTE 1 For general diesel engine warranty, paraffinic automotive diesel fuel may need a validation step, which for some existing engines may 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 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 590:2004, *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 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 ISO 2160, *Petroleum products — Corrosiveness to copper — Copper strip test (ISO 2160:1998)*

EN ISO 2719, *Determination of flash point — Pensky-Martens closed cup method (ISO 2719:2002)*

EN ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104:1994, including Cor. 1:1998 and Cor. 2:1999)*

EN ISO 3170, *Petroleum liquids — Manual sampling (ISO 3170:2004)*

EN ISO 3171 *Petroleum liquids — Automatic pipeline sampling (ISO 3171:1988)*

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

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

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

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

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

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

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

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

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

EN ISO 12937, *Petroleum products — Determination of water — Coulometric Karl Fisher titration method (ISO 12937:2000)*

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

EN ISO 20846, *Petroleum products — Determination of sulfur content of automotive fuels — Ultraviolet fluorescence method (ISO 20846:2004)*

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

ASTM D1159-07, *Standard Test Method for Bromine Numbers of Petroleum Distillates and Commercial Aliphatic Olefins by Electrometric Titration*

ASTM D2710-99, *Standard Test Method for Bromine Index of Petroleum Hydrocarbons by Electrometric Titration*

SS 155116:1993, *Petroleum products — Determination of aromatics in diesel fuel — Mono- and dicyclic aromatic compounds and PAH*

UOP 495-03, *Aromatics in Molex™ process n-paraffin products by ultraviolet spectrophotometry*

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.

NOTE 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.

In view of the sensitivity of some of the test methods referred to in this Workshop Agreement, 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 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.

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