

**Automotive fuels - Determination of manganese and iron content in diesel - Inductively coupled plasma optical emission spectrometry (ICP OES) method**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 16576:2014 sisaldab Euroopa standardi EN 16576:2014 inglisekeelset teksti.	This Estonian standard EVS-EN 16576:2014 consists of the English text of the European standard EN 16576:2014.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.11.2014.	Date of Availability of the European standard is 12.11.2014.
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ICS 75.160.20

English Version

Automotive fuels - Determination of manganese and iron content  
in diesel - Inductively coupled plasma optical emission  
spectrometry (ICP OES) method

Carburants pour automobiles - Détermination des teneurs  
en manganèse et en fer dans carburants diesel - Méthode  
spectrométrique optique par plasma à couplage inductif  
(ICP OES)

Kraftstoffe für Kraftfahrzeuge - Bestimmung des Gehaltes  
an Mangan und Eisen in Dieseldieselkraftstoff - Optische  
Emissionsspektrometrie mit induktiv gekoppeltem Plasma  
(ICP OES)

This European Standard was approved by CEN on 20 September 2014.

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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  
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## Foreword

This document (EN 16576:2014) 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of an identical text or by endorsement, at the latest by May 2015 and conflicting national standards shall be withdrawn at the latest by May 2015.

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 answers requirements originating from the amended Fuels Quality Directive (FQD, [1]).

A similar technique for unleaded petrol is described in EN 16136 [2].

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, 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 a method based on inductively coupled plasma optical emission spectrometry (ICP OES) for the determination of manganese content and of iron content, each from about 0,5 mg/l to about 7,0 mg/l in diesel fuels including those containing up to about 10 % (V/V) fatty acid methylester (FAME).

**WARNING — The use of this European Standard may involve hazardous materials, operations and equipment. This European Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this European Standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.**

NOTE 1 Manganese and iron contents higher than 7,0 mg/l can be measured after preliminary dilution of the sample with a suitable solvent. However, the precision has not been established for such a procedure.

NOTE 2 For the purposes of this European Standard, the term “% (V/V)” is used to represent the volume fraction ( $\varphi$ ) of a material.

## 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 ISO 1042, *Laboratory glassware — One-mark volumetric flasks (ISO 1042)*

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

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

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

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

## 3 Principle

A diesel fuel sample is diluted with a hydrocarbon solvent. The solution is introduced directly into the plasma of an ICP OES spectrometer. Iron and manganese contents are calculated by comparison with calibration solutions prepared from suitable iron and manganese compounds. An internal standard is employed to correct viscosity effects.

## 4 Reagents

Unless specified otherwise, only chemicals which are known to have a high degree of purity shall be used.

**4.1 Kerosene**, boiling range between 150 °C and 250 °C, analytical reagent grade.

Other grades of kerosene with analyte concentrations below the detection limits for the two elements under investigation may be used. In this case, perform a wavelength check for absence of signals from the corresponding elements as well as for absence of spectral interference.

**4.2 Manganese standard solution**, dissolved in oil,  $\mu(\text{Mn}) = 100 \text{ mg/kg}$ .