

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

## EESTI STANDARDI EESSÕNA

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ICS 75.160.20

English Version

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

Carburants pour automobiles - Détermination de la teneur en manganèse dans les essences sans plomb - Méthode spectrométrique optique par plasma à couplage inductif (ICP OES)

Kraftstoffe für Kraftfahrzeuge - Bestimmung des Mangangehalts in unverbleitem Ottokraftstoff - Optische Emissionsspektrometrie mit induktiv gekoppeltem Plasma (ICP OES)

This European Standard was approved by CEN on 29 October 2011.

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## Foreword

This document (EN 16136:2011) 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of an identical text or by endorsement, at the latest by June 2012, and conflicting national standards shall be withdrawn at the latest by June 2012.

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 [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, 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.

## 1 Scope

This European Standard specifies a method based on inductively coupled plasma optical emission spectrometry (ICP OES) for the determination of manganese content present as methylcyclopentadienyl manganese tricarbonyl (MMT <sup>1)</sup>) in unleaded petrol from about 2 mg/l to about 8 mg/l. This test method is applicable to unleaded petrol containing up to 3,7 % (*m/m*) oxygen, including those with ethanol up to 10 % (*V/V*).

NOTE 1 Manganese as MMT is added to petrol to increase anti-knock properties.

**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 2 Solutions of MMT in petrol are unstable when exposed to light. Low and erratic results are expected if petrol samples are exposed to light prior the analysis.

NOTE 3 Manganese contents higher than 8 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 4 Application of the test method to the determination of other manganese compounds in petrol has not been tested.

NOTE 5 For the purposes of this European Standard, the terms “% (*m/m*)” and “% (*V/V*)” are used to represent the mass fraction ( $\mu$ ) and the volume fraction ( $\phi$ ) of a material respectively.

## 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 ISO 1042, *Laboratory glassware — One-mark volumetric flasks (ISO 1042:1998)*

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

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

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

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

## 3 Principle

A petrol sample is diluted with a hydrocarbon solvent. The solution is introduced directly into the plasma of an ICP OES spectrometer. Manganese content is calculated by comparison with calibration solutions prepared from suitable manganese compounds.

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1) MMT is a registered trademark of Ethyl Corporation.