



**NSAI**  
Standards

Irish Standard  
I.S. EN 16997:2017

Liquid petroleum products - Determination of the sulfur content in Ethanol (E85) automotive fuel- Wavelength dispersive X-ray fluorescence spectrometric method

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I.S. EN 16997:2017

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## National Foreword

I.S. EN 16997:2017 is the adopted Irish version of the European Document EN 16997:2017, Liquid petroleum products - Determination of the sulfur content in Ethanol (E85) automotive fuel- Wavelength dispersive X-ray fluorescence spectrometric method

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EUROPEAN STANDARD

EN 16997

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2017

ICS 75.160.20

English Version

## Liquid petroleum products - Determination of the sulfur content in Ethanol (E85) automotive fuel- Wavelength dispersive X-ray fluorescence spectrometric method

Produits pétroliers liquides - Détermination de la teneur en soufre dans le carburant éthanol pour automobiles (E85) - Méthode spectrométrique par fluorescence de rayons X dispersive en longueur d'onde

Flüssige Mineralölerzeugnisse - Bestimmung des Schwefelgehalts in Ethanolkraftstoff (E85) - Wellenlängendispersives Röntgenfluoreszenz-Spektrometrie-Verfahren

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## European foreword

This document (EN 16997:2017) 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of an identical text or by endorsement, at the latest by February 2018, and conflicting national standards shall be withdrawn at the latest by February 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

The methodology described in this document is based on EN ISO 20884 [1] and EN 15485 [2].

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

## 1 Scope

This European Standard specifies a wavelength-dispersive X-ray fluorescence (WDXRF) test method for the determination of the sulfur content in ethanol (E85) automotive fuel [3], containing ethanol between 50 % (V/V) and 85 % (V/V), from 5 mg/kg to 20 mg/kg, using instruments with either monochromatic or polychromatic excitation.

NOTE 1 Sulfur contents higher than 20 mg/kg can be determined after sample dilution with an appropriate solvent. However, the precision was not established for diluted samples.

NOTE 2 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 ( $\varphi$ ) of a material respectively.

**WARNING** — The use of this Standard can involve hazardous materials, operations and equipment. This Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of users of this standard to take appropriate measures to ensure the safety and health of personnel prior to application of the standard, and fulfil statutory and regulatory requirements for this purpose.

## 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 3170, *Petroleum liquids - Manual sampling (ISO 3170)*

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

EN ISO 22854, *Liquid petroleum products - Determination of hydrocarbon types and oxygenates in automotive-motor gasoline and in ethanol (E85) automotive fuel - Multidimensional gas chromatography method (ISO 22854)*

## 3 Principle

The sample under analysis is exposed in a sample cell to the primary radiation of an X-ray tube. The count rates of the S K-L<sub>2,3</sub> X-ray fluorescence and the count rate of the background radiation are measured. The correlation between the pulse rate and the concentration is calculated by software. The matrix effects are compensated either on the basis of fundamental parameters or using a correction table. The sulfur content is then determined using this calibration.

## 4 Reagents and materials

### 4.1 General

Compounds with a minimum purity of 99 % (m/m) as in 4.2 to 4.4. Where the purity of these compounds is less than 99 % (m/m), the concentrations and nature of all impurities shall be established.

A correction for chemical impurity may be applied when the sulfur content is known with accuracy.

Certified reference materials (CRMs) from accredited suppliers are suitable alternatives to the compounds listed in 4.2 to 4.4.

**4.2 Dibutylsulfide**, of nominal sulfur content 21,92 % (m/m), **or dibutyldisulfide**, of nominal sulfur content 35,95 % (m/m), used as a calibrating substance for sulfur.



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