

Liquid petroleum products - Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels - Ignition delay and combustion delay determination using a constant volume combustion chamber with direct fuel injection

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16715:2015 sisaldab Euroopa standardi EN 16715:2015 ingliskeelset teksti.	This Estonian standard EVS-EN 16715:2015 consists of the English text of the European standard EN 16715:2015.
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English Version

Liquid petroleum products - Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels - Ignition delay and combustion delay determination using a constant volume combustion chamber with direct fuel injection

Produits pétroliers liquides - Détermination du délai d'inflammation et de l'indice de cétane dérivé (ICD) des distillats moyens - Détermination du délai d'inflammation et de combustion en utilisant une chambre à volume constant avec injection directe de gazole

Flüssige Mineralölerzeugnisse - Bestimmung des Zündverzugs und der abgeleiteten Cetanzahl (ACZ) von Kraftstoffen aus Mitteldestillaten - Bestimmung des Zündverzugs und des Verbrennungsverzugs in einer Verbrennungskammer mit konstantem Volumen und direkter Kraftstoffeinspritzung

This European Standard was approved by CEN on 20 June 2015.

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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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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 16715:2015) 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of an identical text or by endorsement, at the latest by February 2016 and conflicting national standards shall be withdrawn at the latest by February 2016.

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.

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Introduction

This European Standard is derived from joint standardization work within the Energy Institute and ASTM International. It is based on and technically equivalent with ASTM D7668 [1].

The described method is an alternative quantitative determination of the cetane number of middle distillate fuels intended for use in compression ignition engines. A correlation study between this method and EN ISO 5165:1998 [2] has been done and the results of this are incorporated in this European Standard. Research Report RR: D02-1771 [3].

The basis of this method is the derived cetane number (DCN) correlation equation as given in Clause 12. The on-going validation of the equation is monitored and evaluated through the existing American and European fuel exchange programs. The validation data will be reviewed by CEN/TC 19 with a frequency of at least every two years. As a result of the review, CEN/TC 19 may make the decision to, if necessary, modify the existing equation/correlation or develop a new one. As part of this review, the sample types will be examined, and if certain types are underrepresented, further steps may be taken to evaluate how they perform.

The ignition delay (ID) and combustion delay (CD) values and the DCN value determined by this test method can provide a measure of the ignition characteristics of diesel fuel oil used in compression ignition engines. This test is for use by engine manufacturers, petroleum refiners and marketers, and in commerce as a specification aid to relate or match fuels and engines. This test is also applicable to non-conventional diesel fuels.

For the moment the basics of one type of apparatus are described. Once more correlation data on different types of derived cetane number testing equipment is available, CEN/TC 19 will consider revising this European Standard.

1 Scope

This European Standard specifies a test method for the quantitative determination of ignition and combustion delays of middle distillate fuels intended for use in compression ignition engines. The method utilizes a constant volume combustion chamber with direct fuel injection into heated, compressed synthetic air. A dynamic pressure wave is produced from the combustion of the product under test. An equation is given to calculate the derived cetane number (DCN) from the ignition and combustion delays determined from the dynamic pressure curve.

This European Standard is applicable to middle distillate fuels, fatty acid methyl esters (FAME) and blends of diesel fuels and FAME. The method is also applicable to middle distillate fuels of non-petroleum origin, oil-sands based fuels, blends of fuel containing biodiesel material, diesel fuel oils containing cetane number improver additives and low-sulfur diesel fuel oils. However, users applying this standard especially to unconventional distillate fuels are warned that the relationship between derived cetane number and combustion behaviour in real engines is not yet fully understood.

This European Standard covers the ignition delay range from 2,47 ms to 4,09 ms and combustion delay from 3,71 ms to 6,74 ms (67 DCN to 39 DCN).

NOTE 1 The combustion analyser can measure shorter or longer ignition and combustion delays, but precision is not known.

NOTE 2 There is no information about how DCNs outside the 67 to 39 range compare to EN ISO 5165.

NOTE 3 For the purpose of this European Standard, the expression “% (V/V)” is used to represent the volume fraction (φ), and “% (m/m)” the mass fraction (ω).

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 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

ISO 1998-2, *Petroleum industry - Terminology - Part 2: Properties and tests*

IP 537, *Determination of the purity of Derived Cetane Number reference materials - Gas chromatography method*