

**Petroleum products - Determination of
knock characteristics of motor and aviation
fuels - Motor method**

Petroleum products - Determination of knock
characteristics of motor and aviation fuels - Motor
method

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 5163:2005 sisaldab Euroopa standardi EN ISO 5163:2005 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 28.12.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 5163:2005 consists of the English text of the European standard EN ISO 5163:2005.</p> <p>This document is endorsed on 28.12.2005 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p>Käsitlusala:</p> <p>This International Standard establishes the rating of liquid spark-ignition engine fuel in terms of an arbitrary scale of octane numbers using a standard single-cylinder, four-stroke cycle, variable-compression ratio, carburetted, CFR engine operated at constant speed.</p>	<p>Scope:</p> <p>This International Standard establishes the rating of liquid spark-ignition engine fuel in terms of an arbitrary scale of octane numbers using a standard single-cylinder, four-stroke cycle, variable-compression ratio, carburetted, CFR engine operated at constant speed.</p>
---	---

ICS 75.160.20

Võtmesõnad: chemical analysis, gasoline, measurement, tests

English Version

Petroleum products - Determination of knock characteristics of
motor and aviation fuels - Motor method (ISO 5163:2005)

Produits pétroliers - Détermination des caractéristiques
antidétonantes des carburants pour moteurs automobile et
aviation - Méthode moteur (ISO 5163:2005)

Mineralölerzeugnisse - Bestimmung der Klopfestigkeit von
Otto- und Flugkraftstoffen - Motor-Verfahren (ISO
5163:2005)

This European Standard was approved by CEN on 19 September 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of ISO 5163:2005 has been prepared by Technical Committee ISO/TC 28 "Petroleum products and lubricants" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 5163:2005 by Technical Committee CEN/TC 19 "Petroleum products, lubricants and related products", 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 April 2006, and conflicting national standards shall be withdrawn at the latest by April 2006.

This document supersedes EN 25163:1993.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 5163:2005 has been approved by CEN as EN ISO 5163:2005 without any modifications.

**Petroleum products — Determination of
knock characteristics of motor and
aviation fuels — Motor method**

*Produits pétroliers — Détermination des caractéristiques antidétonantes
des carburants pour moteurs automobile et aviation — Méthode moteur*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Principle	3
5 Reagents and reference materials	3
6 Apparatus	5
7 Sampling and sample preparation	5
8 Basic engine and instrument settings and standard operating conditions	6
9 Engine calibration and qualification	11
10 Procedure	13
11 Calculation	15
12 Expression of results	16
13 Precision	16
14 Test report	17
Bibliography	19

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 5163 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

This third edition cancels and replaces the second edition (ISO 5163:1990), which has been technically revised.

Introduction

The purpose of this International Standard is to accord ISO status to a test procedure that is already used in a standardized form all over the world. The procedure in question is published by ASTM International as Standard Test Method D 2700-01a.

By publishing this International Standard, ISO recognizes that this method is used in its original text in many member countries and that the standard equipment and many of the accessories and materials required for the method are obtainable only from specific manufacturers or suppliers. To carry out the procedure requires reference to six annexes and three appendices of ASTM D 2700-01a, contained in the Annual Book of ASTM Standards, Section 5¹⁾. The annexes detail the specific equipment and instrumentation required, the critical component settings and adjustments, and include the working tables of referenced settings. The appendices provide background and additional insight about auxiliary equipment, operational techniques and the concepts relative to proper maintenance of the engine and instrumentation items.

The accumulated motor and aviation-type fuel data relating to knock characteristics determined in many countries has, for many years, been based on the use of the CFR engine²⁾ and the ASTM octane test methods. Accepted worldwide, petroleum industry octane number requirements for motor and aviation-type fuels are defined by the motor method and associated CFR F-2 Octane Rating Unit, which emphasizes the need for this method and test equipment to be standardized. The initiation of studies to use a different engine for ISO purposes has therefore been considered an unnecessary duplication of effort.

It is further recognized that this method for rating motor and aviation-type fuels, which does include metric operating conditions, is nevertheless an exceptional case in that the CFR engine is manufactured to inch dimensions and requires numerous settings and adjustments to inch dimensions. Application of metrication to these dimensions and tolerances can only be accomplished by strict numerical conversion which would not reflect proper metric engineering practice. Attempts to utilize metric measurement instruments for checking component dimensions to the numerically converted metric values would only introduce an additional source of test variability.

For these reasons, it has been considered desirable by ISO Technical Committee 28, *Petroleum products and lubricants*, to adopt the ASTM D 2700 standard rewritten to comply with the ISO Directives, Part 2, *Rules for the structure and drafting of International Standards*. However, this International Standard refers to annexes and appendices of ASTM D 2700 without change because of their extensive detail. These annexes and appendices are not included in this International Standard because they are published in the Annual Book of ASTM Standards, Section 5.

1) Copies may be purchased directly from the publisher, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA, telephone: +1 610-832-9585, fax: +1 610-832-9555, e-mail: service@astm.org, website: www.astm.org.

2) The sole manufacturer of the Model CFR F-2 Octane Rating Unit is Waukesha Engine, Dresser, Inc., 1000 West St. Paul Avenue, Waukesha, WI 53188, USA.

Petroleum products — Determination of knock characteristics of motor and aviation fuels — Motor method

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

1 Scope

This International Standard establishes the rating of liquid spark-ignition engine fuel in terms of an arbitrary scale of octane numbers using a standard single-cylinder, four-stroke cycle, variable-compression ratio, carburetted, CFR engine operated at constant speed. Motor octane number (MON) provides a measure of the knock characteristics of motor fuels in automotive engines under severe conditions of operation. The motor octane number provides a measure of the knock characteristics of aviation fuels in aviation piston engines, by using an equation to correlate to aviation-method octane number or performance number (lean-mixture aviation rating).

This International Standard is applicable for the entire scale range from 0 MON to 120 MON, but the working range is 40 MON to 120 MON. Typical motor fuel testing is in the range of 80 MON to 90 MON. Typical aviation fuel testing is in the range of 98 MON to 102 MON.

This International Standard can be used for oxygenate-containing fuels containing up to 4,0 % (m/m) oxygen.

Certain gases and fumes, such as halogenated refrigerants used in air-conditioning equipment that can be present in the area where the CFR engine is located, may have a measurable effect on the MON rating. Electrical power transient voltage or frequency surges or distortion can affect MON ratings.

NOTE 1 This International Standard specifies operating conditions in SI units but engine measurements are specified in inch-pound units because these are the units used in the manufacture of the equipment, and thus some references in this International Standard include these units in parenthesis.

NOTE 2 For the purposes of this International Standard, the expressions “% (m/m)” and “% (V/V)” are used to represent the mass and volume fractions 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.

ISO 3170:2004, *Petroleum liquids — Manual sampling*

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

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 4787:1984, *Laboratory glassware — Volumetric glassware — Methods for use and testing of capacity*

ASTM D 2700-01a, *Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel*