

Petroleum products - Calculation of cetane index of middle-distillate fuels by the four variable equation (ISO 4264:2018)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 4264:2018 sisaldab Euroopa standardi EN ISO 4264:2018 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 4264:2018 consists of the English text of the European standard EN ISO 4264:2018.
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 18.07.2018.	Date of Availability of the European standard is 18.07.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 75.160.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

**Petroleum products - Calculation of cetane index of
middle-distillate fuels by the four variable equation (ISO
4264:2018)**

Produits pétroliers - Calcul de l'indice de cétane des
distillats moyens par équation à quatre variables (ISO
4264:2018)

Mineralölerzeugnisse - Berechnung des Cetanindex
von Mitteldestillat-Kraftstoffen aus der 4-Parameter-
Gleichung (ISO 4264:2018)

This European Standard was approved by CEN on 23 May 2018.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO 4264:2018) has been prepared by Technical Committee ISO/TC 28 "Petroleum and related products, fuels and lubricants from natural or synthetic sources" in collaboration with 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 January 2019, and conflicting national standards shall be withdrawn at the latest by January 2019.

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.

This document supersedes EN ISO 4264:2007.

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

Endorsement notice

The text of ISO 4264:2018 has been approved by CEN as EN ISO 4264:2018 without any modification.

Contents		Page
Foreword		iv
1	Scope	1
2	Normative references	2
3	Terms and definitions	2
4	Principle	2
5	Procedure	2
6	Calculation	3
7	Expression of results	3
8	Precision	3
9	Test report	3
Annex A (informative) Calculated cetane index by means of nomographs		5

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 4264:2007), which has been technically revised.

The main changes from the previous edition are as follows:

- this edition includes a statement on the existence of sample specific bias;
- the second procedure to establish the cetane index using nomography is moved into an informative annex;
- ISO 3924 is added as an alternative to test method ISO 3405.

Petroleum products — Calculation of cetane index of middle-distillate fuels by the four variable equation

WARNING — Use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this document to take appropriate measures to ensure the safety and health of personnel prior to application of the document and to determine the applicability of any other restrictions for this purpose.

1 Scope

This document specifies a procedure for the calculation of the cetane index of middle-distillate fuels from petroleum-derived sources. The calculated value is termed the “cetane index by four-variable equation”. Throughout the remaining text of this document, the term “cetane index” implies cetane index by four-variable equation.

This document is applicable to fuels containing non-petroleum derivatives from tar sand and oil shale. It is not applicable to pure hydrocarbons, nor to distillate fuels derived from coal. Cetane index calculations do not take into account the effects from additives used to enhance the Cetane number.

NOTE 1 This document was originally developed using a matrix of fuels, some of which contain non-petroleum derivatives from tar sands and oil shale.

NOTE 2 The cetane index is not an alternative way to express the cetane number; it is a supplementary tool, to be used with due regard for its limitations.

NOTE 3 The cetane index is used to estimate the cetane number of diesel fuel when a test engine is not available to determine this property directly, or when insufficient sample is available for an engine rating.

The most suitable range of fuel properties for application of this document is as follows:

Fuel property	Range
Cetane number	32,5 to 56,5
Density at 15 °C, kg/m ³	805,0 to 895,0
10 % (V/V) distillation recovery temperature, °C	171 to 259
50 % (V/V) distillation recovery temperature, °C	212 to 308
90 % (V/V) distillation recovery temperature, °C	251 to 363

Within the range of cetane number (32,5 to 56,5), the expected error of the prediction via the cetane index equation will be less than ± 2 cetane numbers for 65 % of the distillate fuels examined. Errors can be greater for fuels whose properties fall outside this range of application.

As a consequence of sample-specific biases observed, the expected error can be greater even when the fuel's properties fall inside the recommended range of application. Therefore, users can assess the required degree of prediction agreement to determine the fitness-for-use of the prediction.

NOTE 4 Sample specific biases were observed for distillate fuels containing FAME (fatty acid methyl ester).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 91, *Petroleum and related products — Temperature and pressure volume correction factors (petroleum measurement tables) and standard reference*

ISO 3405, *Petroleum products — Determination of distillation characteristics at atmospheric pressure*

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

ISO 3924, *Petroleum products — Determination of boiling range distribution — Gas chromatography method*

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

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Principle

The density at 15 °C and the temperatures at which 10 % (V/V), 50 % (V/V) and 90 % (V/V) are recovered (distillation recovery temperatures) are determined by standard test methods and the cetane index is calculated from these test data using known correlations.

5 Procedure

5.1 Determine the density at 15 °C of the sample, to the nearest 0,1 kg/m³, by the procedure described in ISO 3675 or ISO 12185, using the corrections given in ISO 91 if appropriate.

5.2 Determine the temperatures, to the nearest 1 °C, at which 10 % (V/V), 50 % (V/V) and 90 % (V/V) of the sample is recovered during distillation, corrected to standard barometric pressure, by the procedure described in ISO 3405.

5.3 Test method ISO 3924 may be used as an alternative to test method ISO 3405 to determine the 10 %, 50 % and 90 % recovery temperatures of the fuel.

5.4 If test method ISO 3924 is used, convert the ISO 3924 data to estimated ISO 3405 data, following instructions of the former document on the calculation of equivalent data, and use the estimated ISO 3405 data in place of actual ISO 3405 data in the calculations.