

<b>STN</b>	<b>Ropné výrobky</b> <b>Stanovenie vznietivosti motorovových náft</b> <b>Stanovenie cetánového čísla motorovou metódou</b> <b>(ISO 5165: 2020)</b>	<b>STN</b> <b>EN ISO 5165</b>  65 6196
------------	---	---

Petroleum products - Determination of the ignition quality of diesel fuels - Cetane engine method (ISO 5165:2020)

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/20

Obsahuje: EN ISO 5165:2020, ISO 5165:2020

Oznámením tejto normy sa ruší  
STN EN ISO 5165 (65 6196) z augusta 2018

**131821**

EUROPEAN STANDARD

EN ISO 5165

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2020

ICS 75.160.20

Supersedes EN ISO 5165:2018

English Version

## Petroleum products - Determination of the ignition quality of diesel fuels - Cetane engine method (ISO 5165:2020)

Produits pétroliers - Détermination de la qualité d'inflammabilité des carburants pour moteurs diesel - Méthode cétane (ISO 5165:2020)

Mineralölerzeugnisse - Bestimmung der Zündwilligkeit von Dieselmotoren - Cetan-Verfahren mit dem CFR-Motor (ISO 5165:2020)

This European Standard was approved by CEN on 2 July 2020.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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**

**EN ISO 5165:2020 (E)**

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

## **European foreword**

This document (EN ISO 5165:2020) 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 February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

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 5165:2018.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **Endorsement notice**

The text of ISO 5165:2020 has been approved by CEN as EN ISO 5165:2020 without any modification.

# INTERNATIONAL STANDARD

# ISO 5165

Fifth edition  
2020-07

---

---

## **Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method**

*Produits pétroliers — Détermination de la qualité d'inflammabilité  
des carburants pour moteurs diesel — Méthode cétane*



Reference number  
ISO 5165:2020(E)

© ISO 2020

**ISO 5165:2020(E)****COPYRIGHT PROTECTED DOCUMENT**

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Principle</b> .....	<b>3</b>
<b>5 Reagents and reference materials</b> .....	<b>4</b>
<b>6 Apparatus</b> .....	<b>5</b>
6.1 Test engine assembly.....	5
6.2 Instrumentation.....	5
6.3 Reference fuels dispensing equipment.....	7
6.4 Injector nozzle tester.....	7
6.5 Special maintenance tools.....	8
<b>7 Sampling and sample preparation</b> .....	<b>8</b>
<b>8 Basic engine and instrument settings and standard operating conditions</b> .....	<b>8</b>
8.1 Installation of engine equipment and instrumentation.....	8
8.2 Engine speed.....	8
8.3 Valve timing.....	8
8.4 Valve lift.....	9
8.5 Fuel pump timing.....	9
8.6 Fuel pump inlet pressure.....	9
8.7 Direction of engine rotation.....	9
8.8 Injection timing.....	9
8.9 Injector nozzle opening pressure.....	9
8.10 Injection flow rate.....	9
8.11 Injector coolant passage temperature.....	9
8.12 Valve clearances.....	9
8.13 Oil pressure.....	9
8.14 Oil temperature.....	9
8.15 Cylinder jacket coolant temperature.....	10
8.16 Intake air temperature.....	10
8.17 Basic ignition delay.....	10
8.18 Cylinder jacket coolant level.....	10
8.19 Engine-crankcase lubricating oil level.....	10
8.20 Crankcase internal pressure.....	10
8.21 Exhaust back-pressure.....	10
8.22 Exhaust and crankcase breather system resonance.....	10
8.23 Piston over-travel.....	10
8.24 Belt tension.....	10
8.25 Injector opening or release pressure.....	11
8.26 Injector spray pattern.....	11
8.27 Indexing handwheel reading.....	11
8.27.1 General.....	11
8.27.2 Basic setting of variable compression plug.....	11
8.27.3 Setting handwheel micrometer drum and scale.....	11
8.27.4 Setting handwheel reading.....	11
8.28 Basic compression pressure.....	12
8.29 Fuel pump lubricating oil level.....	12
8.30 Fuel pump timing gear-box oil level.....	12
8.31 Setting instrumentation reference pickups.....	13
8.32 Setting injector pickup gap.....	13
<b>9 Engine qualification</b> .....	<b>13</b>

**ISO 5165:2020(E)**

9.1	Engine conformity.....	13
9.2	Checking performance on check fuels.....	13
9.3	Check in the case of nonconformity.....	13
<b>10</b>	<b>Procedure.....</b>	<b>14</b>
10.1	General.....	14
10.2	Sample introduction.....	14
10.3	Fuel flow rate.....	14
10.4	Fuel injection timing.....	14
10.5	Ignition delay.....	14
10.6	Equilibration.....	14
10.7	Handwheel reading.....	14
10.8	Reference fuel no. 1.....	14
10.9	Reference fuel no. 2.....	15
10.10	Number of blends of reference fuels.....	16
10.11	Repeat readings.....	16
<b>11</b>	<b>Calculation.....</b>	<b>16</b>
<b>12</b>	<b>Expression of results.....</b>	<b>18</b>
<b>13</b>	<b>Precision.....</b>	<b>18</b>
13.1	General.....	18
13.2	Repeatability, <i>r</i> .....	18
13.3	Reproducibility, <i>R</i> .....	18
13.4	Precision basis.....	18
<b>14</b>	<b>Test report.....</b>	<b>19</b>
	<b>Bibliography.....</b>	<b>20</b>



## 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](http://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](http://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 of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 19, *Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 5165:2017), which has been technically revised. It is aligned with ASTM D613. The main changes to the previous edition are as follows:

- requirements for primary reference fuels (PRFs), secondary reference fuels (SRFs) and check fuels have been added;
- new low cetane primary reference fuel, pentamethylheptane (PMH), as an alternative to heptamethylnonane (HMN), have been added;
- new reporting requirements.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).



# Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method

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

## 1 Scope

This document establishes the rating of diesel fuel oil in terms of an arbitrary scale of cetane numbers (CNs) using a standard single cylinder, four-stroke cycle, variable compression ratio, indirect injected diesel engine. The CN provides a measure of the ignition characteristics of diesel fuel oil in compression ignition engines. The CN is determined at constant speed in a pre-combustion chamber-type compression ignition test engine. However, the relationship of test engine performance to full scale, variable speed and variable load engines is not completely understood.

This document is applicable for the entire scale range from 0 CN to 100 CN but typical testing is in the range of 30 CN to 65 CN. An interlaboratory study executed by CEN in 2013 (10 samples in the range 52,4 CN to 73,8 CN)<sup>[3]</sup> confirmed that paraffinic diesel from synthesis or hydrotreatment, containing up to a volume fraction of 7 % fatty acid methyl ester (FAME), can be tested by this test method and that the precision is comparable to conventional fuels.

This test can be used for unconventional fuels such as synthetics or vegetable oils. However, the precision for those fuels has not been established and the relationship to the performance of such materials in full-scale engines is not completely understood.

Samples with fluid properties that interfere with the gravity flow of fuel to the fuel pump or delivery through the injector nozzle are not suitable for rating by this method.

**NOTE** This document specifies operating conditions in SI units but engine measurements are specified in inch-pound units or Fahrenheit because these are the historical units used in the manufacture of the equipment, and thus some references in this document include these and other non-SI units in parenthesis.

## 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 3170, *Petroleum liquids — Manual sampling*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

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

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

ASTM D613, *Standard Test Method for Cetane Number of Diesel Fuel Oil*

ASTM D3703, *Test Method for Hydroperoxide Number of Aviation Turbine Fuels, Gasoline and Diesel Fuels*

ASTM E832-81, *Standard Specification for Laboratory Filter Papers*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**