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**Nafta in sorodni proizvodi - Natančnost merilnih metod in rezultatov - 1. del:
Določanje natančnosti podatkov preskusnih metod (ISO 4259-1:2026)**

Petroleum and related products - Precision of measurement methods and results - Part
1: Determination of precision data in relation to methods of test (ISO 4259-1:2026)

Mineralöl und verwandte Produkte - Präzision von Messverfahren und Ergebnissen - Teil
1: Bestimmung der Präzisionsdaten von Prüfverfahren (ISO 4259-1:2026)

Produits pétroliers et connexes - Fidélité des méthodes de mesure et de leurs résultats -
Partie 1: Détermination des valeurs de fidélité relatives aux méthodes d'essai (ISO 4259-
1:2026)

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75.080	Naftni proizvodi na splošno	Petroleum products in general
75.180.30	Oprema za merjenje prostornine in merjenje	Volumetric equipment and measurements

SIST EN ISO 4259-1:2026

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EUROPEAN STANDARD
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EUROPÄISCHE NORM

EN ISO 4259-1

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Petroleum and related products - Precision of
measurement methods and results - Part 1: Determination
of precision data in relation to methods of test (ISO 4259-
1:2026)

Produits pétroliers et connexes - Fidélité des méthodes
de mesure et de leurs résultats - Partie 1:
Détermination des valeurs de fidélité relatives aux
méthodes d'essai (ISO 4259-1:2026)

Mineralöl und verwandte Produkte - Präzision von
Messverfahren und Ergebnissen - Teil 1: Bestimmung
der Präzisionsdaten von Prüfverfahren (ISO 4259-
1:2026)

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

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European foreword

This document (EN ISO 4259-1:2026) 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.

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International Standard

ISO 4259-1

Petroleum and related products — Precision of measurement methods and results —

Part 1: Determination of precision data in relation to methods of test

*Produits pétroliers et connexes — Fidélité des méthodes de
mesure et de leurs résultats —*

*Partie 1: Détermination des valeurs de fidélité relatives aux
méthodes d'essai*

**Second edition
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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.

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 second edition cancels and replaces the first edition (ISO 4259-1:2017), which has been technically revised. It also incorporates the Amendments ISO 4259-1:2017/Amd 1:2019 and ISO 4259-1:2017/Amd 2:2020.

The main changes are as follows:

- in 4.4, the sufficient number of samples in the ILS has been modified to at least six;
- in 4.4, Formula (2) has been modified to ensure that no sample has a leverage exceeding $4/n_t$;
- in Annex B, the explanation for choosing 30 as minimum degrees of freedom has been improved.

A list of all parts in the ISO 4259 series can be found on the ISO website.

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.

ISO 4259-1:2026(en)**Introduction**

For purposes of quality control and to check conformity with specifications, the properties of commercial petroleum products are assessed by standard laboratory test methods. Two or more measurements of the same property of a specific sample by a specific test method, or, by different test methods that purport to measure the same property, will not usually give exactly the same result. It is therefore necessary to take proper account of this fact, by arriving at statistically based estimates of the precision for a method, i.e. an objective measure of the degree of agreement expected between two or more results obtained in specified circumstances.

The ISO 4259 series encompasses both the derivation of precision estimates and the application of precision data. The ISO 4259 series combines the information in ASTM D6300^[4] regarding the determination of the precision estimates and the information in ASTM D3244^[3] for the utilization of test data.

Careful investigations should be carried out before applying this document to products for which the assumption of homogeneity can be questioned.

A glossary of the variables used in this document and ISO 4259-2^[1] is included for information as [Annex I](#).

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Petroleum and related products — Precision of measurement methods and results —

Part 1:

Determination of precision data in relation to methods of test

1 Scope

This document specifies the methodology for the design, planning, and execution of an interlaboratory study (ILS) and calculation of precision estimates of a test method specified by the study. In particular:

- it defines the relevant statistical terms,
- it specifies the procedures to be adopted in the planning and execution of an ILS to determine the precision of a test method, and
- it specifies the method of calculating the precision from the results of such a study.

The procedures in this document have been designed specifically for petroleum and petroleum related products, which are normally considered as homogeneous. However, the procedures described in this document can also be applied to other types of homogeneous products.

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 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1 analysis of variance

technique that enables the total variance of a method to be broken down into its component factors

3.2 accepted reference value

agreed-upon reference value for a specific property of a material determined using an accepted reference method and protocol, e.g. derived from an *interlaboratory study* (3.8)

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3.3**between laboratory variance**

component of the total *variance* (3.23) attributable to the difference between the *means* (3.10) of different laboratories

Note 1 to entry: When results obtained by more than one laboratory are compared, the scatter is usually wider than when the same number of tests is carried out by a single laboratory, and there is some variation between means obtained by different laboratories. These give rise to the between laboratory variance which is that component of the overall variance due to the difference in the means obtained by different laboratories.

Note 2 to entry: There is a corresponding definition for between operator variance.

Note 3 to entry: The term “between laboratory” is often shortened to “laboratory” when used to qualify representative parameters of the dispersion of the population of results, for example as “laboratory variance”.

3.4**bias**

of a test method> difference between the population mean of test *results* (3.19) from a very large number of different laboratories for the property of a material obtained using a specific test method versus the *accepted reference value* (3.2) for the property where this is available

Note 1 to entry: See Note 1 to entry in 3.12 for an interpretation of “population mean of test results”.

3.5**blind coding**

assignment of a different number to each sample so that no other identification or information on any sample is given to the *operator* (3.13)

3.6**degrees of freedom**

divisor used in the calculation of *variance* (3.23)

Note 1 to entry: This definition applies strictly only in the simplest cases. Definitions for more complex cases are beyond the scope of this document.

3.7**determination**

process of carrying out the series of operations specified in a test method, whereby a single value is obtained

3.8**interlaboratory study****ILS**

study specifically designed to estimate the repeatability and reproducibility of a test method achieved at a fixed point in time by multiple laboratories through the statistical analysis of their test *results* (3.19) obtained on aliquots prepared from multiple materials

3.9**known value**

quantitative value for a property that can be theoretically derived or calculated by the preparation of the sample

Note 1 to entry: The known value does not always exist, for example for empirical tests such as flash point.

3.10**mean**

sum of a set of *results* (3.19) divided by the number of results

3.11**mean square**

sum of squares (3.21) divided by the *degrees of freedom* (3.6)

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3.12

normal distribution

probability distribution of a continuous random variable, x , such that, if x is any real number, the probability density is as shown in [Formula \(1\)](#):

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right], -\infty < x < \infty \quad (1)$$

Note 1 to entry: In the context of modelling a distribution of test results, μ is the population *mean* ([3.10](#)), or *true value* ([3.22](#)) of the property as determined by a specific test method; σ is the *standard deviation* ([3.20](#)) of the normal distribution used to describe the distribution of an infinite number of test results obtained using the same test method by an infinite number of laboratories ($\sigma > 0$).

3.13

operator

person who normally and regularly carries out a particular test

3.14

outlier

result ([3.19](#)) far enough in magnitude from other results to be considered not a part of the set

3.15

precision

closeness of agreement between the *results* ([3.19](#)) obtained by applying the same test procedure several times on essentially the same materials and under prescribed conditions

Note 1 to entry: The smaller the random part of the experimental error, the more precise the procedure.

3.16

random error

component of measurement error that in replicate measurements varies in an unpredictable manner

3.17

repeatability

quantitative expression for the *random error* ([3.16](#)) associated with the difference between two independent *results* ([3.19](#)) obtained under repeatability conditions in the normal and correct operation of the same method, that is expected to be exceeded with an approximate probability of 5 %

Note 1 to entry: The representative parameter for the dispersion of the population that can be associated with these results is repeatability *standard deviation* ([3.20](#)) or repeatability *variance* ([3.23](#)). Repeatability refers to the maximum difference attributable to random variation between two results obtained under the state of minimum random variability. Therefore, the period of time during which repeat results are to be obtained should be short enough to exclude time dependent variation, for example, variation caused by environmental changes, or variation associated with multiple calibrations.

Note 2 to entry: The term “repeatability” is not to be confused with the terms “between repeats” or “repeats”.

Note 3 to entry: The conditions where independent test *results* ([3.19](#)) are obtained using the same method for test material are considered to be the same in the same laboratory by the same *operator* ([3.13](#)) using the same equipment with short intervals of time. This is also known as the repeatability conditions.

3.18

reproducibility

quantitative expression for the *random error* ([3.16](#)) associated with the difference between two independent *results* ([3.19](#)) obtained under reproducibility conditions in the normal and correct operation of the same method, that is expected to be exceeded with an approximate probability of 5 %

Note 1 to entry: The representative parameter of the dispersion of the population that can be associated with these *results* ([3.19](#)) is reproducibility *standard deviation* ([3.20](#)) or reproducibility *variance* ([3.23](#)). Reproducibility refers to the maximum difference attributable to random variation between two results obtained under the state of maximum random variability.