



# SLOVENSKI STANDARD SIST EN ISO 3924:2016

01-december-2016

Nadomešča:  
SIST EN ISO 3924:2010

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## Naftni proizvodi - Določevanje destilacijskega območja - Metoda plinske kromatografije (ISO 3924:2016)

Petroleum products - Determination of boiling range distribution - Gas chromatography method (ISO 3924:2016)

Mineralölerzeugnisse - Bestimmung der Siedebereichsverteilung - Gaschromatographisches Verfahren (ISO 3924:2016)  
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Produits pétroliers - Détermination de la répartition dans l'intervalle de distillation - Méthode par chromatographie en phase gazeuse (ISO 3924:2016)  
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**Ta slovenski standard je istoveten z: EN ISO 3924:2016**

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### **ICS:**

71.040.50	Fizikalnokemijske analitske metode	Physicochemical methods of analysis
75.080	Naftni proizvodi na splošno	Petroleum products in general

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EUROPEAN STANDARD

EN ISO 3924

NORME EUROPÉENNE

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English Version

## Petroleum products - Determination of boiling range distribution - Gas chromatography method (ISO 3924:2016)

Produits pétroliers - Détermination de la répartition dans l'intervalle de distillation - Méthode par chromatographie en phase gazeuse (ISO 3924:2016)

Mineralölerzeugnisse - Bestimmung des Siedeverlaufs - Gaschromatographisches Verfahren (ISO 3924:2016)

This European Standard was approved by CEN on 15 July 2016.

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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN ISO 3924:2016) has been prepared by Technical Committee ISO/TC 28 "Petroleum products and related products of synthetic or biological origin" 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of an identical text or by endorsement, at the latest by April 2017, and conflicting national standards shall be withdrawn at the latest by April 2017.

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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INTERNATIONAL  
STANDARD

ISO  
3924

Fourth edition  
2016-09-15

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

*Produits pétroliers — Détermination de la répartition dans l'intervalle  
de distillation — Méthode par chromatographie en phase gazeuse*

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## ISO 3924:2016(E)

### 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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

ISO 3924 was prepared by 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 collaboration with ISO Technical Committee ISO/TC 28, *Petroleum products and related products of synthetic or biological origin*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 3924:2010), which has been technically revised. The third edition had several updates regarding the calculation of ISO 3405<sup>[1]</sup> equivalent data. Because ISO 3924 is extensively used and referenced in many fuel specifications, a faster analysis procedure was included. Many fuel specifications concerned demand volume percentage recovered at 250°C and 350°C but this result was not part of the report of ISO 3924 in the former version as described. This is updated with this edition (see [Annex A](#)), for which an assessment has been executed by CEN/TC 19. In addition, several editorial updates have been made.

This method is originally based on the jointed IP 406<sup>[3]</sup> and ASTM D2887<sup>[4]</sup> methods.

# Petroleum products — Determination of boiling range distribution — Gas chromatography method

**WARNING** — — The use of this International Standard can involve hazardous materials, operations and equipment. This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of users of this International 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.

## 1 Scope

This International Standard specifies a method for the determination of the boiling range distribution of petroleum products. The method is applicable to petroleum products and fractions with a final boiling point of 538 °C or lower at atmospheric pressure as determined by this International Standard. This International Standard is not applicable to gasoline samples or gasoline components. The method is limited to products having a boiling range greater than 55 °C and having a vapour pressure sufficiently low to permit sampling at ambient temperature.

The method has successfully been applied to samples containing fatty acid methyl esters (FAME) up to 10 % (V/V).

**NOTE** For the purposes of this International Standard, the terms “% (m/m)” and % (V/V) are used to represent the mass fraction ( $\mu$ ), respectively the volume fraction ( $\varphi$ ) of a material.

## 2 Normative references

SIST EN ISO 3924:2016

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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.

ISO 3170, *Petroleum liquids — Manual sampling*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

## 3 Terms and definitions

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

### 3.1

#### initial boiling point

##### IBP

temperature corresponding to the retention time at which a net area count equal to 0,5 % of the total sample area under the chromatogram is obtained

### 3.2

#### final boiling point

##### FBP

temperature corresponding to the retention time at which a net area count equal to 99,5 % of the total sample area under the chromatogram is obtained

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### 3.3

#### slice rate

number of data slices acquired per unit of time used to integrate the continuous (analogue) chromatographic detector response during an analysis

Note 1 to entry: The slice rate is expressed in Hz (for example, slices per second).

## 4 Principle

A sample is introduced into a gas chromatographic column which separates hydrocarbons in the order of increasing boiling point. The column temperature is raised at a reproducible rate and the area under the chromatogram is recorded throughout the analysis. Boiling temperatures are assigned to the time axis from a calibration curve, obtained under the same conditions by running a known mixture of hydrocarbons covering the boiling range expected in the sample. From these data, the boiling range distribution is obtained.

[Annex A](#) presents a correlation model for the calculation of physical distillation (see References [1], [5] and [6]) equivalent data from boiling range distribution analysis by gas chromatography determined following this International Standard.

[Annex B](#) describes an alternative, accelerated analysis (see [8.2](#)).

## 5 Reagents and materials

### 5.1 Stationary phase for columns, non-polar, that elutes hydrocarbons in boiling point order.

NOTE The following materials have been used successfully as liquid phases.

For packed columns:

- silicone gum rubber UC-W98; <https://standards.iteh.ai/catalog/standards/sist/b9fe2e50-6e4e-417e-a855-ed63f8de490e/sist-en-iso-3924-2016>
- silicone gum rubber GE-SE-30;
- silicone gum rubber OV-1;
- silicone gum rubber OV-101;

For capillary columns:

- polydimethylsiloxane.

### 5.2 Solid support for packed columns, usually consisting of crushed fire brick or chromatographic diatomaceous earth.

The particle size and support loading shall be such as to give optimum resolution and analysis time.

NOTE In general, support loadings of 3 % to 10 % have been found most satisfactory.

### 5.3 Carrier gas, with a minimum purity of 99,995 %, constituted of

- a) helium or hydrogen for use with thermal conductivity detectors, or
- b) nitrogen, helium, hydrogen or argon for use with flame ionization detectors.

### 5.4 Hydrogen, grade suitable for flame ionization detectors.

### 5.5 Compressed air, free of oil and water, regulated for flame ionization detectors.