SLOVENSKI STANDARD
SIST EN ISO 3924:2010

01-april-2010

Naftni proizvodi - Določevanje destilacijskega območja - Metoda plinske kromatografije (ISO 3924:2010)

Petroleum products - Determination of boiling range distribution - Gas chromatography method (ISO 3924:2010)

Mineralölerzeugnisse - Bestimmung der Siedebereichsverteilung - Gaschromatographisches Verfahren (ISO 3924:2010)

Produits pétroliers - Détermination de la répartition dans l'intervalle de distillation - Méthode par chromatographie en phase gazeuse (ISO 3924:2010)

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75.080	Naftni proizvodi na splošno	Petroleum products in general

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English Version

Petroleum products - Determination of boiling range distribution - Gas chromatography method (ISO 3924:2010)

Produits pétroliers - Détermination de la répartition dans l'intervalle de distillation - Méthode par chromatographie en phase gazeuse (ISO 3924:2010)

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN ISO 3924:2010) has been prepared by 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, in collaboration with Technical Committee ISO/TC 28 "Petroleum products and lubricants".

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INTERNATIONAL STANDARD

ISO 3924

Third edition
2010-02-15

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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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.

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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 Technical Committee ISO/TC 28, *Petroleum products and lubricants*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This method is harmonized with the analogous IP 406[3] and ASTM D2887[4] methods.

This third edition cancels and replaces the second edition (ISO 3924:1999), to which two additional informative annexes, Annexes A and B, have been added and some updating on definitions has been incorporated. (The Annex A in ISO 3924:1999 has become Annex C in this revised edition.) Annex A basically contains a table for a correlation of certain data with those obtained using the ISO 3405 method and some extra wording to the basic procedure, without changing the scope. With this information, the revised ISO 3924 becomes an updated document, describing the method actually in practice without changing the basic procedure. The data presented in Annex A allow a reference in modern, global specifications, such as for aviation fuels. This underlines the fact that availability of these chemical data in an ISO method supports their use in these specific fields.

Also, because ISO 3924 is extensively used and referenced in many fuel specifications and there is a requirement for a faster method, Annex B describes a method that, without any instrumental adaptation, reduces the analysis time by a factor 5.

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

WARNING — The use of this International Standard may 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 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 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 biodiesel up to 10 %.

NOTE For the purposes of this International Standard, the term "% (*m/m*)" is used to represent the mass fraction of a material.

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 3405:2000, *Petroleum products — Determination of distillation characteristics at atmospheric pressure*

ISO 4259:2006, *Petroleum products — Determination and application of precision data in relation to methods of test*

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

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 The slice rate is expressed in hertz (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 (ISO 3405-, IP 123[6]- or ASTM D86[5]-equivalent data) from boiling-range distribution analysis by gas chromatography determined following this International Standard.

Annex B describes an alternative, accelerated analysis.

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:

a) for packed columns:
   - silicone gum rubber UC-W98,
   - silicone gum rubber GE-SE-30,
   - silicone gum rubber OV-1,
   - silicone gum rubber OV-101;

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

5.4 Calibration mixture, consisting of an accurately weighed mixture of hydrocarbons covering the range from C_5 to C_{44} and dissolved in carbon disulfide (5.6).

