# SLOVENSKI STANDARD
# SIST EN ISO 23874:2018

**01-december-2018**

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**Zemeljski plin - Zahteve plinske kromatografije za izračun rosišča ogljikovodikov (ISO 23874:2006)**

Natural gas - Gas chromatographic requirements for hydrocarbon dewpoint calculation (ISO 23874:2006)

Erdgas - Gaschromatographische Anforderungen für die Berechnung des Taupunktes von Kohlenwasserstoff (ISO 23874:2006)



Gaz naturel - Exigences relatives à la chromatographie en phase gazeuse pour le calcul du point de rosée hydrocarbures (ISO 23874:2006)



**Ta slovenski standard je istoveten z:** **EN ISO 23874:2018**

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|---|---|---|
| 71.040.50 | Fizikalnokemijske analitske metode | Physicochemical methods of analysis |
| 75.060 | Zemeljski plin | Natural gas |

**SIST EN ISO 23874:2018** **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN ISO 23874

September 2018

ICS 75.060

English Version

# Natural gas - Gas chromatographic requirements for hydrocarbon dewpoint calculation (ISO 23874:2006)

Gaz naturel - Exigences relatives à la chromatographie en phase gazeuse pour le calcul du point de rosée hydrocarbures (ISO 23874:2006)

Erdgas - Gaschromatographische Anforderungen für die Berechnung des Taupunktes von Kohlenwasserstoff (ISO 23874:2006)

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

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## European foreword

The text of ISO 23874:2006 has been prepared by Technical Committee ISO/TC 193 "Natural gas" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 23874:2018 by Technical Committee CEN/TC 238 "Test gases, test pressures, appliance categories and gas appliance types" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by March 2019, and conflicting national standards shall be withdrawn at the latest by March 2019.

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## Endorsement notice

The text of ISO 23874:2006 has been approved by CEN as EN ISO 23874:2018 without any modification.

INTERNATIONAL STANDARD

**ISO 23874**

First edition
2006-11-15

# Natural gas — Gas chromatographic requirements for hydrocarbon dewpoint calculation

*Gaz naturel — Exigences relatives à la chromatographie en phase gazeuse pour le calcul du point de rosée hydrocarbures*



Reference number
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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.

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.

ISO 23874 was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*.



 

# Natural gas — Gas chromatographic requirements for hydrocarbon dewpoint calculation

## 1 Scope

This International Standard describes the performance requirements for analysis of treated natural gas of transmission or pipeline quality in sufficient detail so that the hydrocarbon dewpoint temperature can be calculated using an appropriate equation of state. It can be applied to gases that have maximum dewpoint temperatures (cricondentherms) between 0 °C and – 50 °C. The pressures at which these maximum dewpoint temperatures are calculated are in the range 2 MPa (20 bar) to 5 MPa (50 bar). Major components are measured using ISO 6974 (all parts) and the ranges of components that can be measured are as defined in ISO 6974-1. The procedure given in this International Standard covers the measurement of hydrocarbons in the range $C_5$ to $C_{12}$. *n*-Pentane, which is quantitatively measured using ISO 6974 (all parts), is used as a bridge component and all $C_6$ and higher hydrocarbons are measured relative to *n*-pentane.

## 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 6974-1, *Natural gas — Determination of composition with defined uncertainty by gas chromatography — Part 1: Guidelines for tailored analysis*

ISO 6974-2, *Natural gas — Determination of composition with defined uncertainty by gas chromatography — Part 2: Measuring-system characteristics and statistics for processing of data*

ISO 6974-3, *Natural gas — Determination of composition with defined uncertainty by gas chromatography — Part 3: Determination of hydrogen, helium, oxygen, nitrogen, carbon dioxide and hydrocarbons up to $C_8$ using two packed columns*

ISO 6974-4, *Natural gas — Determination of composition with defined uncertainty by gas chromatography — Part 4: Determination of nitrogen, carbon dioxide and $C_1$ to $C_5$ and $C_{6+}$ hydrocarbons for a laboratory and on-line measuring system using two columns*

ISO 6974-5, *Natural gas — Determination of composition with defined uncertainty by gas chromatography — Part 5: Determination of nitrogen, carbon dioxide and $C_1$ to $C_5$ and $C_{6+}$ hydrocarbons for a laboratory and on-line process application using three columns*

ISO 6974-6, *Natural gas — Determination of composition with defined uncertainty by gas chromatography — Part 6: Determination of hydrogen, helium, oxygen, nitrogen, carbon dioxide and $C_1$ to $C_8$ hydrocarbons using three capillary columns*

ISO 6975, *Natural gas — Extended analysis — Gas-chromatographic method*

ISO 10715, *Natural gas — Sampling guidelines*

## 3 Principle

For hydrocarbon gas mixtures such as natural gas, the phase boundary or dewpoint line distinguishing single-phase gas from gas-liquid mixtures is a complex function of pressure, temperature and composition. For a given composition, the pressure at which the dewpoint temperature is at a maximum is intermediate between those found in transmission and distribution operations. The analysis shall be comprehensive for inert components and for hydrocarbons up to $C_{12}$. It is not necessary to measure helium, hydrogen, water and sulfur compounds unless any of these is present at greater than 0,01 mole fraction.

The analysis shall be performed in two parts. Major components (nitrogen, carbon dioxide and hydrocarbons from $C_1$ to $C_5$) shall be analysed according to ISO 6974 (all parts). Higher hydrocarbons ($C_5$ to $C_{12}$) shall be analysed to satisfy the requirements given in this International Standard. This allows the traceability of measurements according to ISO 6974 (all parts) to be extended to the higher hydrocarbons.

It is not possible to identify all the measured higher hydrocarbons, nor is it possible to obtain a reference gas mixture that contains more than a few representatives of the higher hydrocarbons. The analytical data are, therefore, handled with a number of simplifying assumptions.

— Unidentified components are allocated a carbon number or molar mass according to their positions in the chromatogram with respect to identified *n*-alkanes.

— Alkanes of carbon number 7 and above are summed by carbon number and treated as fractions for input to the dewpoint calculation.

— Average boiling points and densities of fractions are calculated from the individual boiling points and quantities of the components that comprise them; individual-component boiling points are calculated by interpolation between the bracketing *n*-alkanes [1].

— Sample components are quantified by comparison with *n*-pentane, which has been measured according to ISO 6974 (all parts), using relative response factors based on their allocated carbon numbers.



NOTE When using ISO 6974 (all parts), *n*-pentane can be measured as a direct component that is also present in the calibration-gas mixture, or as an indirect component using a response factor relative to a different component (for example, *n*-butane) in the calibration gas mixture. In either case, the uncertainty on the quantity of *n*-pentane can be calculated according to ISO 6974-2.

## 4 Materials

**4.1 Certified-reference gas mixture for major components** (CRM1), such as is required for ISO 6974 (all parts).

Depending upon the working range and the accuracy required, more than one CRM can be needed.

**4.2 Certified-reference gas mixture, for higher hydrocarbons** (CRM2), containing as a minimum, *n*-pentane, *n*-hexane, benzene, cyclohexane, *n*-heptane, toluene, methylcyclohexane and *n*-octane. Ideally, the CRM2 should also contain *n*-nonane, *n*-decane, *n*-undecane and *n*-dodecane in methane.

The mole fractions of components in CRM2 shall be chosen to be appropriate for the application, provided that the mixture is stable and free from the possibility of condensation in transport, storage and in use.

## 5 Apparatus

**5.1 Measurement system for major components**, comprised of a sample introduction and transfer unit, a separation unit, a detection unit, an integrator and a data reduction system, capable of meeting the analytical requirements described in 6.1.