SIST

SLOVENSKI STANDARD
oSIST prEN ISO 6974-3:2017

01-december-2017

Zemeljski plin - Določevanje sestave s plinsko kromatografijo in s tem povezana negotovost - 3. del: Natančnost in odstopanje (ISO/DIS 6974-3:2017)

Natural gas - Determination of composition and associated uncertainty by gas chromatography - Part 3: Precision and bias (ISO/DIS 6974-3:2017)

Erdgas - Bestimmung der Zusammensetzung und der zugehörigen Unsicherheit durch Gaschromatographie - Teil 3: Präzision und Bias (ISO/DIS 6974-3:2017)

Gaz naturel - Détermination de la composition et de l'incertitude associée par chromatographie en phase gazeuse - Partie 3: Fidélité et biais (ISO/DIS 6974-3:2017)

Ta slovenski standard je istoveten z: prEN ISO 6974-3

ICS:

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

oSIST prEN ISO 6974-3:2017 en,fr,de

DRAFT INTERNATIONAL STANDARD

ISO/DIS 6974-3

ISO/TC **193**/SC **1**

Secretariat: **NEN**

Voting begins on:
2017-10-04

Voting terminates on:
2017-12-27

Natural gas — Determination of composition and associated uncertainty by gas chromatography —

Part 3:
Precision and bias

Gaz naturel — Détermination de la composition et de l'incertitude associée par chromatographie en phase gazeuse —

Partie 3: Fidélité et biais

ICS: 75.060

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 6974-3:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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. 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. 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.

The committee responsible for this document is ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas.*

A list of all parts in the ISO 6974- series can be found on the ISO website.

Natural gas — Determination of composition and associated uncertainty by gas chromatography —

Part 3: Precision and bias

1 Scope

This part of ISO 6974 describes the precision that can be expected from the gas chromatographic method that is set up in accordance with part 1 of this standard. The stated precision provides values for the magnitude of variability that can be expected between test results when the method described in part 1 of this standard is applied in one or more competent laboratories. This part of ISO 6974 also gives guidance on the assessment of bias.

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 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

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*

ISO 6974-1, *Natural gas — Determination of composition and associated uncertainty by gas chromatography — Part 1: General guidelines and calculation of composition*

JCGM 200, *International Vocabulary of metrology —– Basic and general concepts and associated terms (VIM), 3rd edition*

3 Terms and definitions

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

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

— IEC Electropedia: available at: http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
measurement precision
closeness of agreement between indications or measured quantity values obtained by replicate measurements on the same or similar objects under specified conditions

Note 1 to entry: Measurement precision is usually expressed numerically by measures of imprecision, such as standard deviation, variance, or coefficient of variation under the specified conditions of measurement.

Note 2 to entry: The 'specified conditions' can be, for example, repeatability conditions of measurement, intermediate precision conditions of measurement, or reproducibility conditions of measurement (see ISO 5725-1:1994).

Note 3 to entry: Measurement precision is used to define measurement repeatability, intermediate measurement precision, and measurement reproducibility.

Note 4 to entry: Sometimes “measurement precision” is erroneously used to mean measurement accuracy.

[SOURCE: JCGM 200:2012, 2.15]

3.2
error of measurement
measured quantity value minus a reference quantity value

Note 1 to entry: The concept of ‘measurement error’ can be used both

a) when there is a single reference quantity value to refer to, which occurs if a calibration is made by means of a measurement standard with a measured quantity value having a negligible measurement uncertainty or if a conventional quantity value is given, in which case the measurement error is known, and
b) if a measurand is supposed to be represented by a unique true quantity value of a set of true quantity values of negligible range in which case the measurement error is not known

Note 2 to entry: Measurement error should not be confused with production error or mistake.

[SOURCE: JCGM 200:2012, 2.16]

3.3
systematic measurement error
component of measurement error that in replicate measurements remains constant or varies in a predictable manner

Note 1 to entry: A reference quantity value for a systematic measurement error is a true quantity value, or a measured quantity value of a measurement standard of negligible measurement uncertainty, or a conventional quantity value.

Note 2 to entry: Systematic measurement error, and its causes, can be known or unknown. A correction can be applied to compensate for a known systematic measurement error.

Note 3 to entry: Systematic measurement error equals measurement error minus random measurement error.

[SOURCE: JCGM 200:2012, 2.17]

3.4
measurement bias
estimate of a systematic measurement error

[SOURCE: JCGM 200:2012, 2.18]

3.5
laboratory bias
difference between the expectation of the test results from a particular laboratory and an accepted reference value

[SOURCE: ISO 5725-1, 3.9]

3.6
random measurement error
component of measurement error that in replicate measurements varies in an unpredictable manner

Note 1 to entry: A reference quantity value for a random measurement error is the average that would ensue from an infinite number of replicate measurements of the same measurand.

Note 2 to entry: Random measurement errors of a set of replicate measurements form a distribution that can be summarized by its expectation, which is generally assumed to be zero, and its variance.

Note 3 to entry: Random measurement error equals measurement error minus systematic measurement error.

[SOURCE: JCGM 200:2012, 2.19]

3.7
repeatability condition of measurement
condition of measurement, out of a set of conditions that includes the same measurement procedure, same operators, same measuring system, same operating conditions and same location, and replicate measurements on the same or similar objects over a short period of time

Note 1 to entry: A condition of measurement is a repeatability condition only with respect to a specified set of repeatability conditions.

Note 2 to entry: In chemistry, the term "intra-serial precision condition of measurement" is sometimes used to designate this concept.

[SOURCE: JCGM 200:2012, 2.20]

3.8
measurement repeatability
measurement precision under a set of repeatability conditions of measurement

[SOURCE: JCGM 200:2012, 2.21]

3.9
reproducibility condition of measurement
condition of measurement, out of a set of conditions that includes different locations, operators, measuring systems, and replicate measurements on the same or similar objects

Note 1 to entry: The different measuring systems may use different measurement procedures.

Note 2 to entry: A specification should give the conditions changed and unchanged, to the extent practical.

[SOURCE: JCGM 200:2012, 2.20]

Note 3 to entry: Where repeatability is related to replicate measurements over a short period of time, reproducibility is related to replicate measurements over a longer period of time.

3.10
measurement reproducibility
measurement precision under reproducibility conditions of measurement

Note 1 to entry: Relevant statistical terms are given in ISO 5725-1:1994 and ISO 5725-2:1994.

[SOURCE: JCGM 200:2012, 2.25]

3.11
assigned value
value attributed to a particular property of a proficiency test item

[SOURCE: ISO 17043, 3.1]

3.12
repeatability standard deviation (s_r)
standard deviation of test results obtained under repeatability conditions

Note 1 to entry: It is a measure of dispersion of the distribution of test results under repeatability conditions.

Note 2 to entry: Similarly "repeatability variance" and "repeatability coefficient of variation" could be defined and used as measures of the dispersion of test results under repeatability conditions.

[SOURCE: ISO 5725-1, 3.15]

3.13
reproducibility standard deviation (s_R)
standard deviation of test results obtained under reproducibility conditions

Note 1 to entry: It is a measure of dispersion of the distribution of test results under reproducibility conditions.

Note 2 to entry: Similarly "reproducibility variance" and "reproducibility coefficient of variation" could be defined and used as measures of the dispersion of test results under reproducibility conditions.

[SOURCE: ISO 5725-1, 3.19]

4 Symbols

s	standard deviation
s_r	repeatability standard deviation
s_R	reproducibility standard deviation
x_i	amount of substance fraction of component *i* in the natural gas mixture

5 Principle

The precision data that can be expected from the gas chromatographic method that is set up in accordance with part 1 of ISO 6974, are based on the statistical evaluation of data from 14 individual Proficiency Testing (PT) exercises that have been organized from 2012 to 2014. The precision is expressed as repeatability and reproducibility.

The scope and component ranges of these PT schemes is given in Table 1.

Table 1 — Scope of Proficiency Testing Schemes

	Mole fraction (%)	
	PT Provider #1	PT Provider #2
Ethane	0.1-14	3 – 9
Propane	0.05-5	2 – 5
i-Butane	0.01-1	0.1 – 1
n-Butane	0.01-1	0.1 – 1
i-Pentane	0.005-0.35	0.02 – 0.5
n-Pentane	0.005-0.35	0.02 – 0.5
Hexane	0.001-0.35	0.01 - 0.1
Nitrogen	0.1-8	0.1 – 8
CO2	0.1-8	0.1 – 8
Methane	balance	65 – 99

Details on the actual data processing can be found in informative Annex A.

6 Reference precision values

Repeatability and reproducibility standard deviations (s_r and s_R respectively) are derived from the PT data. Non-methane components are treated as a group; methane is treated separately.