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I.S. EN ISO 10723:2012

Natural gas - Performance evaluation for analytical systems (ISO 10723:2012)

I.S. EN ISO 10723:2012

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Gaz naturel - Évaluation des performances des systèmes d'analyse (ISO 10723:2012)

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Foreword

This document (EN ISO 10723:2012) has been prepared by Technical Committee ISO/TC 193 "Natural gas".

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of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

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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The text of ISO 10723:2012 has been approved by CEN as a EN ISO 10723:2012 without any modification.

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INTERNATIONAL STANDARD

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Second edition
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Natural gas — Performance evaluation for analytical systems

Gaz naturel — Évaluation des performances des systèmes d'analyse

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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 10723 was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*.

This second edition cancels and replaces the first edition (ISO 10723:1995), which has been technically revised. It also incorporates Technical Corrigendum ISO 10723:1995/Cor.1:1998.

Introduction

This International Standard describes a method for evaluating the performance of analytical systems intended for the analysis of natural gas. Natural gas is assumed to consist predominantly of methane, with other saturated hydrocarbons and non-combustible gases.

Performance evaluation makes no assumption about equipment for and/or methodology of analysis but gives test methods which can be applied to the chosen analytical system, including the method, equipment and sample handling.

This International Standard contains an informative annex (Annex A) that shows the application for an on-line gas chromatographic system which, as described, is assumed to have a response/concentration relationship for all components that is represented by a straight line through the origin. This International Standard contains an additional informative annex (Annex B) that gives a rationale for the approach used for instrument benchmarking.

Natural gas — Performance evaluation for analytical systems

1 Scope

1.1 This International Standard specifies a method of determining whether an analytical system for natural gas analysis is fit for purpose. It can be used either

a) to determine a range of gas compositions to which the method can be applied, using a specified calibration gas, while satisfying previously defined criteria for the maximum errors and uncertainties on the composition or property or both, or

b) to evaluate the range of errors and uncertainties on the composition or property (calculable from composition) or both when analysing gases within a defined range of composition, using a specified calibration gas.

1.2 It is assumed that

a) for evaluations of the first type above, the analytical requirement has been clearly and unambiguously defined, in terms of the range of acceptable uncertainty on the composition, and, where appropriate, the uncertainty in physical properties calculated from these measurements,

b) for applications of the second type above, the analytical requirement has been clearly and unambiguously defined, in terms of the range of composition to be measured and, where appropriate, the range of properties which may be calculated from these measurements,

c) the analytical and calibration procedures have been fully described, and

d) the analytical system is intended to be applied to gases having compositions which vary over ranges normally found in gas transmission and distribution systems.

1.3 If the performance evaluation shows the system to be unsatisfactory in terms of the uncertainty on the component amount fraction or property, or shows limitations in the ranges of composition or property values measurable within the required uncertainty, then it is intended that the operating parameters, including

a) the analytical requirement,

b) the analytical procedure,

c) the choice of equipment,

d) the choice of calibration gas mixture, and

e) the calculation procedure,

be reviewed to assess where improvements can be obtained. Of these parameters, the choice of the calibration gas composition is likely to have the most significant influence.

1.4 This International Standard is applicable to analytical systems which measure individual component amount fractions. For an application such as calorific value determination, the method will be typically gas chromatography, set up, as a minimum, for the measurement of nitrogen, carbon dioxide, individual hydrocarbons from C_1 to C_5 and a composite measurement representing all higher hydrocarbons of carbon number 6 and above. This allows for the calculation of calorific value and similar properties with acceptable accuracy. In addition, components such as H_2S can be measured individually by specific measurement methods to which this evaluation approach can also be applied.

1.5 Performance evaluation of an analytical system is intended to be performed following initial installation to ensure that errors associated with assumed response functions are fit for purpose. Thereafter, periodic performance evaluation is recommended, or whenever any critical component of the analytical system is adjusted or replaced. The appropriate interval between periodic performance evaluations will depend upon both how instrument responses vary with time and also how large an error may be tolerated. This first consideration is dependent upon instrument/operation; the second is dependent on the application. It is not appropriate, therefore, for this International Standard to offer specific recommendations on intervals between performance evaluations.

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/IEC Guide 98-3:2008, *Uncertainty of measurement —Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO 6143:2001, *Gas analysis — Comparison methods for determining and checking the composition of calibration gas mixtures*

ISO 6974-2, *Natural gas — Determination of composition and associated uncertainty by gas chromatography — Part 2: Uncertainty calculations*

ISO 6976:1995, *Natural gas — Calculation of calorific values, density, relative density and Wobbe index from composition*

3 Terms and definitions

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

3.1
uncertainty of measurement
parameter, associated with the result of a measurement, that characterizes the dispersion of values that can reasonably be attributed to the measurand

NOTE In keeping with ISO/IEC Guide 98-3, in this International Standard the uncertainty of the composition is expressed as a standard uncertainty or as an expanded uncertainty calculated through the use of an appropriate coverage factor.

3.2
certified reference gas mixture
CRM
reference gas mixture, characterized by a metrologically valid procedure for one or more specified properties, accompanied by a certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability

NOTE 1 The above definition is based on the definition of “certified reference material” in ISO Guide 35[3]. “Certified reference material” is a generic term; “certified reference gas mixture” is more suited to this application.

NOTE 2 Metrologically valid procedures for the production and certification of reference materials (such as certified reference gas mixtures) are given in, among others, ISO Guide 34[4] and ISO Guide 35[3].

NOTE 3 ISO Guide 31[5] gives guidance on the contents of certificates.