INTERNATIONAL STANDARD

ISO 6141

Third edition
2000-05-01

Gas analysis — Requirements for certificates for calibration gases and gas mixtures

Analyse des gaz — Prescriptions relatives aux certificats de gaz et mélanges de gaz pour étalonnage

Reference number
ISO 6141:2000(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6141 was prepared by Technical Committee ISO/TC 158, *Analysis of gases*.

This third edition cancels and replaces the second edition (ISO 6141:1984), which has been technically revised.

Gas analysis — Requirements for certificates for calibration gases and gas mixtures

1 Scope

This International Standard specifies requirements for certificates for pure gases and for certificates for homogeneous gas mixtures to be used as calibration gases.

This International Standard specifies the minimum information (mandatory data) required and additional information (optional data) recommended for characterizing a pure gas, or a homogeneous gas mixture, supplied under pressure in a cylinder or other container. This International Standard does not cover the field of safety-relevant data and related labelling.

Two different formats are considered for the information specified by this International Standard:

— a certificate, i.e., a document uniquely related to the container; and

— a certificate extract, i.e., a document affixed to the container.

2 Terms and definitions

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

2.1
supplier
organization that has supplied the gas or gas mixture

2.2
customer
organization that has ordered the gas or gas mixture

2.3
container
vessel in which the gas or gas mixture is supplied

2.4
composition
property of a gas or a gas mixture given by the identity and the content of each specified component

2.5
component
chemical substance contained in the gas or gas mixture

2.6
specified component
component whose content is specified quantitatively in the certificate

NOTE In general, the content of the complementary gas is not specified explicitly.

2.7
impurity
component present, but not wanted

2.8
critical impurity
impurity affecting the intended use

2.9
complementary gas
component which completes the gas mixture

NOTE The complementary gas can be a pure gas or a gas mixture.

2.10
standard uncertainty
uncertainty of the content of a specified component, expressed as a standard deviation

NOTE 1 This definition is an adaptation of the definition given in GUM (see reference [1] in the Bibliography).

NOTE 2 The standard uncertainty can be expressed as an absolute value or as a relative value.

2.11
expanded uncertainty
uncertainty of the content of a specified component, expressed as a product of the standard uncertainty and a coverage factor

NOTE 1 This definition is an adaptation of the definition given in GUM [1].

NOTE 2 The expanded uncertainty aims at characterizing a confidence interval at a confidence level of approximately 95 %.

3 Requirements for certificates and certificate extracts

3.1 General

The information specified by this International Standard shall be provided by the supplier of the gas or the gas mixture, in two different formats:

— a certificate, i.e., a document uniquely related to the container; and

— a certificate extract, i.e., a document affixed to the container.

The certificate shall contain as a minimum the data specified as “mandatory” in Table 1. It is recommended that the data specified as “optional” also be included in the certificate.

The certificate extract shall contain as a minimum the data specified as “mandatory” in Table 2. The certificate extract shall be affixed to the container in a secure way, such as in the form of a sticker or tag.

NOTE Consideration should be given to protect the sticker or tag from adverse conditions of exposure.

Requirements for and explanations of the individual data are given in the following clauses. Those data in capital letters, and the associated requirements, are mandatory. When optional data are adopted, then the associated requirements become mandatory.

3.2 Stated information

3.2.1 UNIQUE CERTIFICATE IDENTIFICATION

Each certificate shall be assigned a unique identification.

Table 1 — Specification of certificate data

Mandatory data	Reference	Optional data	Reference
Unique certificate identification	3.2.1	Customer	3.2.4
Container identification	3.2.2	Nominal composition	3.2.5
Supplier	3.2.3	Standard uncertainty	3.3.4/3.4.4
Authorization date	3.2.6	References/ traceability	3.3.6/3.4.6
Responsible person	3.2.7	Method of preparation	3.3.7/3.4.7
Number of pages	3.2.8	Method of analysis	3.3.8/3.4.8
Specified components	3.3.2/3.4.2	Date of preparation	3.3.9/3.4.9
Composition	3.3.3/3.4.3	Date of analysis	3.3.10/3.4.10
Expanded uncertainty	3.3.5/3.4.5	Commercial name	3.3.11/3.4.11
Filling pressure	3.5.2	Container volume	3.5.1
Valve outlet connection	3.5.4	Filling amount	3.5.3
Minimum utilization pressure	3.5.5		
Storage/utilization temperature	3.5.6		
Expiry date	3.5.7		

Table 2 — Specification of certificate extract data

Mandatory data	Reference
Unique certificate identification	3.2.1
Container identification	3.2.2
Specified components	3.3.2/3.4.2
Composition	3.3.3/3.4.3
Expanded uncertainty	3.3.5/3.4.5
Filling pressure	3.5.2
Valve outlet connection	3.5.4
Minimum utilization pressure	3.5.5
Storage/utilization temperature	3.5.6
Expiry date	3.5.7

3.2.2 CONTAINER IDENTIFICATION

Containers for pressurized gases shall be identified by the number that is stamped into the wall, or by batch or lot numbers.

3.2.3 SUPPLIER

The name and address of the supplier shall be stated.

3.2.4 Customer

The name and address of the customer and any other information required by the customer shall be stated.

3.2.5 Nominal composition

The composition of the gas or gas mixture requested by the customer shall be stated.

NOTE In the case of gas mixtures, a quality indication of the gases used in preparation may be appropriate.

3.2.6 AUTHORIZATION DATE

The date the certificate was issued shall be stated.

3.2.7 RESPONSIBLE PERSON

The signature and/or name and/or job title of the person responsible for the information shall be given on the certificate.

3.2.8 NUMBER OF PAGES

The total number of pages of the certificate shall be stated.

3.3 Gas mixture specification

3.3.1 Calibration gases

Gas mixtures to be used as calibration gases shall be supplied as homogeneous compressed gases.

NOTE The filling pressure should be safely below the dew pressure of the gas mixture, and the filling should take place at a temperature within the utilization temperature range.

3.3.2 SPECIFIED COMPONENTS

The names of the specified components of the gas mixture shall be stated in accordance with IUPAC terminology. For the complementary gas a more common name may be used, such as synthetic air.

3.3.3 COMPOSITION

The content of all specified components of the gas mixture shall be stated.

NOTE 1 It is not necessary to specify the content of the complementary gas. For undetected critical impurities, the lower limit of detection of the analytical method should be specified.

NOTE 2 It is preferable to express the contents in mole fractions or in mass fractions, since these quantities are independent of the pressure and the temperature of the gas mixture. If other quantities are used, for instance mass concentration or volume fraction, it is necessary to specify the conditions (pressure and temperature) for which the stated composition is valid.

3.3.4 Standard uncertainty

For every specified component, the standard uncertainty of the content shall be stated.

NOTE The standard uncertainty should include the contributions from all relevant uncertainty sources. The uncertainty sources considered in the evaluation may be specified. The supplier should be ready and able to provide additional information on the evaluation of uncertainty at the request of the customer.

3.3.5 EXPANDED UNCERTAINTY

For every specified component, the expanded uncertainty of the content shall be stated.

The coverage factor used shall be specified.

NOTE It is recommended to use a coverage factor of two.

3.3.6 References/traceability

References shall be given, relating the stated contents and uncertainties to International Standard methods, reference standards of measurement or certified reference materials.

If a calibration gas mixture is stated to be traceable, then the supplier shall specify to the customer, on request, the relevant information on traceability.

3.3.7 Method of preparation

The essential features of the procedure by which the gas mixture was produced shall be stated.

3.3.8 Method of analysis

The essential features of the procedure by which the gas mixture was analyzed shall be stated. This can be the analysis by which the composition was determined or the analysis by which the determined composition was validated.

3.3.9 Date of preparation

The date of preparation shall be stated.

3.3.10 Date of analysis

The date of analysis shall be stated.

3.3.11 Commercial name

The commercial name of the gas mixture, if any, shall be stated.

3.4 Pure gas specification

3.4.1 Quality

In general the quality of pure gases is expressed in numerical terms such as 5,5 or 6,0. However, this should not be mistaken for a quantitative statement of the mole fraction of the gas, since only the contents of the specified impurities are accounted for.

3.4.2 SPECIFIED COMPONENTS

The names of the gas, of the critical impurities, and of any other impurity that has been determined shall be stated.

3.4.3 COMPOSITION

The content of the critical impurities, and of any other impurity that has been determined shall be stated.

NOTE 1 For undetected critical impurities the lower limit of detection of the analytical method should be specified.

NOTE 2 It is preferable to express the content in mole fraction or in mass fraction, since these quantities are independent of the pressure and the temperature of the gas. If other quantities are used, for instance mass concentration or volume fraction, it is necessary to specify the conditions (pressure and temperature) for which the stated composition is valid.

NOTE 3 In the case of liquefied pure gases the composition should refer to the liquid phase.

3.4.4 Standard uncertainty

For all the critical impurities and other impurities that have been determined, the standard uncertainty of the content shall be stated.

NOTE The standard uncertainty should include the contributions from all relevant uncertainty sources. The uncertainty sources considered in the evaluation may be specified. The supplier should be ready and able to provide additional information on the evaluation of uncertainty at the request of the customer.

3.4.5 EXPANDED UNCERTAINTY

For all the critical impurities and other impurities that have been determined, the expanded uncertainty of the content shall be stated.

The coverage factor used shall be specified.

NOTE It is recommended to use a coverage factor of two.

3.4.6 References/traceability

References shall be given, relating the assigned contents and uncertainties to International Standard methods, reference standards of measurement or certified reference materials.

If a pure gas is stated to be traceable, then the supplier shall specify to the customer, on request, the relevant information on traceability.

3.4.7 Method of preparation

The essential features of the procedure by which the gas was produced shall be stated.

3.4.8 Method of analysis

The essential features of the procedure by which the gas was analyzed for impurities shall be stated.

3.4.9 Date of preparation

The date of preparation shall be stated.

3.4.10 Date of analysis

The date of analysis shall be stated.

3.4.11 Commercial name

The commercial name of the gas, if any, shall be stated.

3.5 Additional product information

3.5.1 Container volume

The nominal water capacity of the container shall be stated.

3.5.2 FILLING PRESSURE

The filling or supplied pressure of the gas or gas mixture at a specified reference temperature shall be stated.

A common reference temperature is 15 °C.

3.5.3 Filling amount

The amount of the gas or gas mixture in supplied mass, or in supplied volume at specified reference conditions (pressure and temperature) shall be stated.

Common reference conditions are 1,013 25 bar and 15 °C (see reference [3]).

3.5.4 VALVE OUTLET CONNECTION

The valve outlet connection shall be specified in accordance with (Inter)national Standards and/or regulations.

3.5.5 MINIMUM UTILIZATION PRESSURE

The minimum utilization pressure shall be stated. This is the limiting value of the pressure below which the gas or gas mixture shall no longer be sampled from the container. Below this pressure significant deviations from the stated composition may occur.

NOTE In the case of liquefied pure gases, the minimum amount of gas to be retained in the container may be specified by mass instead of pressure.

3.5.6 STORAGE/UTILIZATION TEMPERATURE

The storage/utilization temperature shall be stated. This is the range of temperatures at which the gas or gas mixture can be used or stored. Outside this temperature range condensation and/or reactions may cause significant deviations from the stated composition.

3.5.7 EXPIRY DATE

The expiry date shall be stated. This is the date until which the supplier guarantees that the composition of the gas or gas mixture is stable, within the limits of expanded uncertainty.

The statement “not applicable” is taken to express that, for specific reasons, an expiry date cannot be given. If this statement is used, these reasons shall be indicated.