ICS 71.040.40 SLOVENSKÁ TECHNICKÁ NORMA September 2025

STN	**Analýza plynov** **Prepočet údajov o zložení pre plynné zmesi** **(ISO 14912: 2025)**	**STN** **EN ISO 14912** 38 5618

Gas analysis - Conversion of gas mixture composition data (ISO 14912:2025)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 08/25

Obsahuje: EN ISO 14912:2025, ISO 14912:2025

Oznámením tejto normy sa ruší
STN EN ISO 14912 (38 5618) z februára 2007

140838

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 14912

May 2025

ICS 71.040.40

Supersedes EN ISO 14912:2006, EN ISO 14912:2006/AC:2007

English Version

Gas analysis - Conversion of gas mixture composition data (ISO 14912:2025)

Analyse des gaz - Conversion des données de composition de mélanges gazeux (ISO 14912:2025)

Gasanalyse - Umrechnung von Zusammensetzungsangaben für Gasgemische (ISO 14912:2025)

This European Standard was approved by CEN on 8 May 2025.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Ref. No. EN ISO 14912:2025 E

Contents

Page

European foreword

This document (EN ISO 14912:2025) has been prepared by Technical Committee ISO/TC 158 "Analysis of gases" in collaboration with 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 November 2025, and conflicting national standards shall be withdrawn at the latest by November 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 14912:2006.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 14912:2025 has been approved by CEN as EN ISO 14912:2025 without any modification.

International Standard

ISO 14912

Gas analysis — Conversion of gas mixture composition data

Analyse des gaz — Conversion des données de composition de mélanges gazeux

Second edition
2025-05

Reference number
ISO 14912:2025(en)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published 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.

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 document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 158, *Analysis of gases,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 238, *Test gases, test pressures, appliance categories and gas appliance types*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 14912:2003 and ISO 14912:2003/Cor.1:2006), which has been technically revised.

The main changes are as follows:

— update of the molar mass data for mixture components in Annex C according to the 2019 to 2021 IUPAC/CIAAW atomic mass data;

— update of the value of the gas constant according to the 2018 revision of the International System of Units (SI);

— update of the bibliography and the corresponding references in the text;

— update of the information in Annex E on the computer programme CONVERT;

— correction of Formulae (37) and (39);

— recalculation of the examples in Annex D;

— addition of a table of molar mass data for the relevant elements from which the molar mass data for mixture components were calculated;

— addition of information concerning data for synthetic air;

— editorial corrections.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The composition of a gas mixture is given by the identity of the mixture components and their content in the mixture. For the purpose of expressing component contents, different quantities are in use, the most common ones being mass concentration, amount fraction and volume fraction. This diversity is due to the fact that in different applications, different quantities have decisive advantages. Therefore, procedures for conversion between different quantities are needed.

As far as these quantities involve volumes, their value depends on the state conditions, i.e., pressure and temperature, of the gas mixture. For these quantities, therefore, procedures for conversion between different state conditions are needed.

As a crude approximation, all of the conversions referred to above can be performed on the basis of the ideal gas law. In most cases, however, an accurate conversion shall take into account the real gas behaviour of the components and of the entire gas mixture. These calculations use values of the compression factor (or the density) of the components concerned and the entire gas mixture.

This document provides conversion procedures which fully account for real gas behaviour of pure gases and gas mixtures. In addition to these, approximate procedures for practical applications are described, designed for different levels of accuracy and available data. These procedures are based on approximate calculations of a) pure gas compression factors using virial coefficients and b) mixture compression factors using component data. Uncertainty estimates are given which account for the uncertainty due to approximations in the conversion procedures and the uncertainty of the input data.

Recently, advanced compression factor calculations for pure gases and gas mixtures, based on multi-parameter equations of state became publicly available (see e.g. NIST Reference Fluid and Transport Properties Database (REFPROP))[17] and were even standardized (see e.g. ISO 20765-2). Concerning accuracy and uncertainty, these tools clearly outperform the simple approach used in ISO 14912 (truncated virial expansion, linear interpolation of virial coefficient data). However, for the intended use of ISO 14912, the performance is sufficent and the simplicity is beneficial for many users.

International Standard **ISO 14912:2025(en)**

Gas analysis — Conversion of gas mixture composition data

1 Scope

This document defines the following quantities commonly used to express the composition of gas mixtures:

— amount fraction and concentration;

— mass fraction and concentration;

— volume fraction and concentration.

For these quantities of composition, this document specifies methods for:

— conversion between different quantities;

— conversion between different state conditions.

Conversion between different quantities means calculating the value of the content of a specified component in terms of one of the quantities listed above from the value of the same content, at the same pressure and temperature of the gas mixture, given in terms of another of these quantities. Conversion between different state conditions means calculating the value of the content of a specified component, in terms of one of the quantities listed above, under one set of state conditions from the value of the same quantity under another set of state conditions, i.e., pressure and temperature, of the gas mixture. Gas mixture composition can be converted simultaneously between different quantities of composition and different state conditions by combination of the two types of conversion.

This document is applicable only to homogeneous and stable gas mixtures. Therefore, any state conditions (pressure and temperature) considered need to be well outside the condensation region of the gas mixture. In addition, volume concentrations can only be used if the component under consideration is completely gaseous, and for the use of volume fractions, all components need to be completely gaseous. Further restrictions of state conditions apply for approximations of compression factors using virial coefficients (see Annex A).

2 Normative references

There are no normative references in this document.