ICS 75.060 SLOVENSKÁ TECHNICKÁ NORMA Apríl 2024

STN	**Analýza zemného plynu Biometán Stanovenie obsahu amoniaku pomocou laserovej absorpčnej spektroskopie s laditeľnou diódou (ISO 2612: 2023)**	**STN EN ISO 2612** 38 6133

Analysis of natural gas - Biomethane - Determination of ammonia content by Tuneable Diode Laser Absorption Spectroscopy (ISO 2612:2023)

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. 03/24

Obsahuje: EN ISO 2612:2023, ISO 2612:2023

138244

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 2612

December 2023

ICS 75.060

English Version

Analysis of natural gas - Biomethane - Determination of ammonia content by Tuneable Diode Laser Absorption Spectroscopy (ISO 2612:2023)

Analyse du gaz naturel - Biométhane - Détermination de la teneur en ammoniac par spectroscopie d'absorption laser à diode accordable (ISO 2612:2023)

Analyse von Erdgas - Biomethan - Bestimmung von Ammoniakanteil durch Absorptionsspektroskopie mittels durchstimmbarer Laserdioden (ISO 2612:2023)

This European Standard was approved by CEN on 20 November 2023.

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 2612:2023 E

Contents

Page

European foreword

This document (EN ISO 2612:2023) has been prepared by Technical Committee ISO/TC 193 "Natural gas" in collaboration with Technical Committee CEN/TC 408 “Natural gas and biomethane for use in transport and biomethane for injection in the natural gas grid” 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 June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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 has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

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 2612:2023 has been approved by CEN as EN ISO 2612:2023 without any modification.

INTERNATIONAL STANDARD

ISO 2612

First edition
2023-12

Analysis of natural gas — Biomethane — Determination of ammonia content by tuneable diode laser absorption spectroscopy

Analyse du gaz naturel — Biométhane — Détermination de la teneur en ammoniac par spectroscopie d'absorption laser à diode accordable

Reference number
ISO 2612:2023(E)

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 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 408, *Natural gas and biomethane for use in transport and biomethane for injection in the natural gas grid,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

Ammonia is a common trace impurity found in biomethane. It is a product from the anaerobic digestion of biomass, formed from the breakdown of amino acids during the production of biogas. As an impurity in biogas and biomethane, ammonia is corrosive when it dissolves in the presence of water, damaging process equipment and leads to an increase in anti-knock processes in combustion engines when used as a fuel for vehicles. Ammonia is detrimental to the environment and as an air pollutant forms particulates which are damaging to public health. Additionally, when present in the combustion of biomethane, ammonia can lead to the formation of nitrogen oxides (NO_x), which are regulated pollutants as they are toxic and affect air quality. Therefore, the presence of ammonia in biogas and biomethane is undesirable to gas distributers and their customers.

Measuring ammonia content in mixtures of methane at the trace level (i.e. mg m^{-3}) is technically difficult due to the adsorptive nature (i.e. "stickiness") of ammonia. Particularly spectral NH_3 measurements can be severely hampered by spectral interferences from the matrix gas components, which further increases the complexity of these measurements. Measurements in biogas or biomethane are also dangerous due to the potentially explosive nature of methane, when mixed with an oxidizer like ambient air.

This method supports the implementation of specifications for biomethane and biogas such as EN 16723-1[8] and EN 16723-2[9] when used in the natural gas grids and when using it as a transportation fuel. Implementation of these specifications require fit-for-purpose measurement methods with known performance and acceptable metrological traceability to support the trade of renewable gases as well as conformity assessment. Currently, methods are referenced in standards such as EN 16723-1 which have not been validated for use with biomethane and biogas. This document describes measurement methods that meet these requirements and can be implemented by laboratories and industry, also those seeking accreditation on the basis of, e.g. ISO/IEC 17025.

The methods described are based on commercially available spectroscopic analysers, specific to the measurement of ammonia. They have been shown to perform at an acceptable level when quantifying the ammonia content of biomethane at the 10 mg m^{-3} level, as specified in, e.g. EN 16723-1.

INTERNATIONAL STANDARD **ISO 2612:2023(E)**

Analysis of natural gas — Biomethane — Determination of ammonia content by tuneable diode laser absorption spectroscopy

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not aim to address all of the safety problems associated with the materials specified. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of any other restrictions prior to use.

1 Scope

This document describes several test methods for measuring the ammonia amount fraction in natural gas and biomethane at the trace level (μmol mol^{-1}). The suitable handling and sampling of pressurised mixtures of ammonia in methane that are applied to several different ammonia measurement systems are described. The measurement systems are comprised of readily available commercial spectroscopic analysers that are specific to ammonia. These NH_3 analysers are considered as a black box in terms of their operation, which is dependent on the instructions of the manufacturer. The document describes suitable calibration and measurement strategies to quantify ammonia in (bio)methane around and above the 10 mg m^{-3} (14 μmol mol^{-1}) level and applies to analysis within absolute pressure ranges of 1 bar – 2 bar, temperatures of 0 °C – 40 °C and relative humidity <90 %.

References are also made to additional standards that are applied either to natural gas analysis or air quality measurements. In this document the matrix gas is always methane or biomethane and the measurand is the amount fraction NH_3.

NOTE 1 bar = 0,1 MPa =10^5 Pa; 1 MPa = 1 N/mm^2.

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

ISO 6145-1, *Gas analysis — Preparation of calibration gas mixtures using dynamic methods — Part 1: General aspects*

ISO 7504, *Gas analysis — Vocabulary*

ISO 9169, *Air quality — Definition and determination of performance characteristics of an automatic measuring system*

ISO 10715, *Natural gas — Gas sampling*

ISO 10723, *Natural gas — Performance evaluation for analytical systems*

ISO 14912, *Gas analysis — Conversion of gas mixture composition data*

ISO 14532, *Natural gas — Vocabulary*

ISO 16664, *Gas analysis — Handling of calibration gases and gas mixtures — Guidelines*

IEC 61207-7, *Expression of performance of gas analyzers — Part 7: Tuneable semiconductor laser gas analyzers*