

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)



BSI Standards Publication

Ambient air — Standard method for the measurement of the concentration of carbon monoxide by non-dispersive infrared spectroscopy

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN 14626:2024. It supersedes BS EN 14626:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/2/3, Ambient atmospheres.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2024
Published by BSI Standards Limited 2024

ISBN 978 0 539 20981 5

ICS 13.040.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2024.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

December 2024

ICS 13.040.20

Supersedes EN 14626:2012

English Version

Ambient air - Standard method for the measurement of the concentration of carbon monoxide by non-dispersive infrared spectroscopy

Air ambiant - Méthode normalisée de mesurage de la concentration en monoxyde de carbone par spectroscopie à rayonnement infrarouge non dispersif

Außenluft - Messverfahren zur Bestimmung der Konzentration von Kohlenmonoxid mit nicht-dispersiver Infrarot-Photometrie

This European Standard was approved by CEN on 11 November 2024.

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

Contents

Page

European foreword.....	5
1 Scope	6
2 Normative references	7
3 Terms and definitions	8
4 Abbreviated terms	13
5 Principle	13
5.1 General.....	13
5.2 Measuring principle	13
5.3 Type testing.....	14
5.4 Field operation and quality control.....	14
6 Sampling.....	15
6.1 General.....	15
6.2 Sampling location.....	15
6.3 Sampling system.....	15
6.3.1 Construction.....	15
6.3.2 Particle filter.....	16
6.3.3 Loss of carbon monoxide.....	16
6.3.4 Conditioning.....	16
6.4 Control and regulation of sample flow rate	16
6.5 Sampling pump for the manifold.....	17
7 Analyser equipment.....	17
7.1 General.....	17
7.2 Details about analyser equipment.....	17
7.3 Pressure measurement.....	17
7.4 Flow rate indicator	17
7.5 Sampling pump for the analyser.....	18
7.6 Particle filter	18
8 Type testing of carbon monoxide analysers.....	18
8.1 General.....	18
8.2 Relevant performance characteristics and performance criteria.....	19
8.3 Design change.....	23
8.4 Procedures for determination of the performance characteristics during the laboratory test	23
8.4.1 General.....	23
8.4.2 Test conditions.....	23
8.4.3 Response time	26
8.4.4 Short-term drift	28
8.4.5 Repeatability standard deviation.....	28
8.4.6 Lack of fit of linearity of the calibration function.....	29
8.4.7 Sensitivity coefficient to sample gas pressure.....	30
8.4.8 Sensitivity coefficient to the sample gas temperature	31
8.4.9 Sensitivity coefficient to the surrounding temperature	31
8.4.10 Sensitivity coefficient to electrical voltage	32
8.4.11 Interferents	33
8.4.12 Averaging test.....	34

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)

8.4.13	Difference sample/calibration port.....	35
8.5	Determination of the performance characteristics during the field test.....	36
8.5.1	General	36
8.5.2	Selection of a monitoring station for the field test.....	36
8.5.3	Operational requirements	37
8.5.4	Long-term drift	38
8.5.5	Reproducibility standard deviation under field conditions	39
8.5.6	Period of unattended operation.....	39
8.5.7	Period of availability of the analyser.....	39
8.6	Expanded uncertainty calculation for type testing.....	40
9	Field operation and ongoing quality control.....	41
9.1	General	41
9.2	Suitability evaluation	41
9.2.1	General	41
9.2.2	Analyser for a monitoring station or task.....	41
9.3	Initial installation	43
9.4	Ongoing quality assurance/quality control	43
9.4.1	General	43
9.4.2	Frequency of calibrations, checks and maintenance.....	44
9.5	Calibration of the analyser.....	47
9.5.1	General	47
9.5.2	Calibration gases.....	48
9.5.3	Data adjustment function	48
9.5.4	Testing the sampling system	48
9.5.5	Treatment of data after exceedance of performance criteria	50
9.6	Checks.....	52
9.6.1	Zero and span checks	52
9.6.2	Lack-of-fit.....	53
9.6.3	Testing the sampling system	54
9.7	Maintenance	56
9.7.1	Change of particle filters.....	56
9.7.2	Maintenance of sampling system.....	56
9.7.3	Change of consumables as applicable	56
9.7.4	Preventive/routine maintenance of components of the analyser.....	56
9.8	Data handling and data reports.....	56
9.9	Measurement uncertainty	57
10	Expression of results	57
11	Test reports and documentation	58
11.1	Type testing	58
11.2	Field operation	59
11.2.1	Suitability evaluation	59
11.2.2	Documentation	59
11.2.3	Ambient air quality data reports	60
Annex A (normative)	Test of lack-of-fit	61
A.1	Establishment of the regression line.....	61
A.2	Calculation of the residuals of the averages	61
Annex B (informative)	Sampling equipment.....	63
Annex C (informative)	Schematics of non-dispersive infrared spectrometer.....	65
Annex D (informative)	Manifold testing.....	67
D.1	Procedure for applying test gas.....	67

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)

D.2	Procedure for the cross test	68
D.2.1	General	68
D.2.2	Initial stage	68
D.2.3	Stage 1	69
D.2.4	Stage 2	69
D.2.5	Data Processing	69
D.2.6	Evaluation	69
Annex E (normative)	Type testing	71
E.1	Type testing and uncertainty calculation	71
E.1.1	Type testing	71
E.1.2	Uncertainty calculation	71
E.2	Type testing Requirement a)	71
E.3	Type testing Requirement b)	73
E.3.1	General	73
E.3.2	Calculation of standard uncertainties	76
E.3.3	Example calculation	83
E.4	Type testing Requirement c)	85
E.5	Type testing Requirement d)	85
E.5.1	General	85
E.5.2	Combined standard uncertainty	87
E.5.3	Absolute expanded uncertainty	87
E.5.4	Relative expanded uncertainty	88
E.5.5	Calculation of standard uncertainties	88
E.5.6	Example calculation	90
Annex F (informative)	Calculation of uncertainty in field operation at the 8-hour limit value ...	92
F.1	General	92
F.2	Combined standard uncertainty	92
F.3	Standard uncertainties	93
F.3.1	General	93
F.3.2	Influence quantities	94
F.3.3	Interferents	97
F.3.4	Averaging effect	98
F.3.5	Reproducibility under field conditions	98
F.3.6	Long-term drift at zero	98
F.3.7	Long-term drift at level of the 8-hour limit value	98
F.3.8	Zero gas	99
F.3.9	Calibration gas	99
F.3.10	Difference sample/calibration port	99
F.4	Example calculation	100
Annex G (informative)	Test stand for the test point "sensitivity coefficient of sample gas pressure"	102
Annex H (informative)	Significant changes	104
Bibliography	105

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)

European foreword

This document (EN 14626:2024) has been prepared by Technical Committee CEN/TC 264 “Air quality, the secretariat of which is held by DIN.

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 2025, and conflicting national standards shall be withdrawn at the latest by June 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 will supersede EN 14626:2012.

In comparison with the previous edition, the technical modifications made are listed in Annex H of this document.

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

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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.

This is a preview of BS EN 14626:2024. [Click here to purchase the full version from the ANSI store.](#)

1 Scope

This document specifies a continuous measurement method for the determination of the concentration of carbon monoxide present in ambient air based on the non-dispersive infrared spectroscopic measuring principle. This document describes the performance characteristics and sets the relevant minimum criteria required to select an appropriate non-dispersive infrared spectroscopic analyser by means of type testing. It also includes the evaluation of the suitability of an analyser for use in a specific fixed site in order to meet data quality requirements (see Annex I of Directive 2008/50/EC [1] for additional information) and requirements during sampling, calibration and quality assurance for use.

The method is applicable to the determination of the mass concentration of carbon monoxide present in ambient air up to 100 mg/m³ of carbon monoxide. This concentration range represents the certification range for type testing.

NOTE 1 Other ranges can be used depending on the levels present in ambient air.

NOTE 2 When the standard is used for other purposes than for measurements required by Directive 2008/50/EC, the ranges and uncertainty requirements might not apply.

The method covers the determination of ambient air concentrations of carbon monoxide in locations classified as rural areas, urban-background areas, and for sampling points influenced by traffic or industrial sources.

The results are expressed in mg/m³ (at 20 °C and 101,3 kPa).

NOTE 3 100 mg/m³ of CO corresponds to 86 µmol/mol of CO.

This document contains information for different groups of users.

Clause 5 to Clause 7 and Annex B, Annex C and Annex D contain general information about the principles of carbon monoxide measurement by non-dispersive infrared spectroscopic analyser and sampling equipment.

Clause 8 and Annex E are specifically directed towards test houses and laboratories that perform type testing of carbon monoxide analysers. These sections contain information about:

- type testing conditions, test procedures and test requirements;
- analyser performance requirements;
- evaluation of the type testing results;
- evaluation of the associated uncertainty of the measurement performed by the carbon monoxide analyser based on the type testing results.

Clause 9 to Clause 11 and Annex F are directed towards monitoring networks performing the practical measurements of carbon monoxide in ambient air. These sections contain information about:

- initial installation of the analyser in the monitoring network and acceptance testing;
- ongoing quality assurance/quality control;
- calculation and reporting of measurement results;