SLOVENSKI STANDARD
SIST EN 50543:2011

01-april-2011

Elektronske prenosne in premične naprave za zaznavanje in merjenje ogljikovega dioksida in/ali ogljikovega monoksida v zraku notranjih prostorov - Zahteve in preskusne metode

Electronic portable and transportable apparatus designed to detect and measure carbon dioxide and/or carbon monoxide in indoor ambient air - Requirements and test methods

Tragbare und transportable elektrische Geräte für die Detektion und Messung von Kohlendioxid und/oder Kohlenmonoxid in Innenraumluft -Anforderungen und Prüfverfahren

Matériels électroniques portables et transportables de détection et de mesure du dioxyde de carbone et/ou du monoxyde de carbone dans l'air ambiant intérieur des locaux - Exigences et méthodes d’essai

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13.320 Alarmni in opozorilni sistemi Alarm and warning systems

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English version

Electronic portable and transportable apparatus designed to detect and measure carbon dioxide and/or carbon monoxide in indoor ambient air - Requirements and test methods

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Tragbare und transportable elektrische Geräte für die Detektion und Messung von Kohlendioxid und/oder Kohlenmonoxid in Innenraumluft - Anforderungen und Prüfverfahren

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 216, Gas detectors.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50543 on 2011-02-01.

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

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2012-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-02-01

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1 Scope

This European Standard specifies requirements for the construction, testing and performance of electronic portable and transportable apparatus for the detection and measurement of carbon dioxide (CO_2) and/or carbon monoxide (CO) in indoor ambient air, which includes air entering mechanical ventilation systems in domestic residential, commercial and industrial premises and public buildings.

This European Standard includes indoor air quality apparatus with CO and CO_2 measuring capabilities.

This European Standard excludes:

- apparatus used in workplace atmospheres for the direct detection and direct concentration measurement of toxic gases and vapours (i.e. conforming to EN 45544 series);
- electronic portable combustion gas analysers (i.e. conforming to EN 50379 series);
- apparatus for the detection of carbon monoxide in domestic premises (i.e. conforming to EN 50291 series).

NOTE 1 Examples of applications are monitoring indoor air quality, measuring CO and/or CO_2 concentrations in commercial laundry and kitchen environments, assessing the safe operation of appliances installed in compartments.

NOTE 2 When this apparatus is used in industrial premises national regulations may apply.

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.

EN 50270:2006, *Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen*

EN 50271:2010, *Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and tests for apparatus using software and/or digital technologies*

EN 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal) (IEC 60068-2-6)*

EN 60335-1:2002 + corr. Jul. 2009 + corr. May 2010, *Household and similar electrical appliances – Safety – Part 1: General requirements (IEC 60335-1:2001, mod.)*

EN 60529:1991 + corr. May. 1993, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

3 Terms and definitions

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

3.1
ambient air
normal atmosphere surrounding the apparatus

NOTE The concentration of CO_2 in ambient air is typically different from the concentration in outdoor air.

3.2
clean air
air that contains CO_2 at outdoor air concentrations but is free of CO and other gases and vapours to which the sensor is sensitive or which influence the performance of the sensor

3.3
battery-powered
apparatus designed to be energized from batteries alone, whether disposable or rechargeable

3.4
mains powered apparatus
apparatus designed to be powered by the domestic mains electrical supply with or without an additional power source

3.5
calibration
process of determining the deviation of a measuring apparatus relative to a certified calibration gas cylinder

3.6
adjustment
process of tuning the apparatus, in order to return the deviation found in calibration to within the admissible error

3.7
aspirated apparatus
gas detection apparatus that obtains the gas by drawing it through a sample line to the gas sensor, for example, by means of a hand-operated or electric pump

3.8
diffusion apparatus
apparatus in which the transfer of gas from the atmosphere to the gas sensor takes place by random molecular movement, i.e. under conditions in which there is no aspirated flow

3.9
domestic residential premises
unit of residential accommodation including residential park homes, flats, bed-sits, maisonettes, terraced, semi-detached and detached houses (including all such residential accommodation situated within or forming part of commercial or industrial or agricultural premises), leisure accommodation vehicles and recreational craft

NOTE It is recognized that the guidance can be applied to premises other than dwellings, such as those supplying a small number of clients on a bed and breakfast basis.

3.10
recreational craft
boat of a minimum length of 2,5 m and a maximum length of 24 m as specified in Directive 94/25/EC, which is intended for sports or leisure purposes

NOTE For the purposes of this European Standard the word ‘boat’ should be taken to mean ‘recreational craft’.

3.11
leisure accommodation vehicles
unit of living accommodation for temporary or seasonal occupation that may meet requirements for construction and use of road vehicles

3.12
probe
part of the measuring system that is placed in ambient air (including air entering a mechanical ventilation system) for the purpose of sampling the gas

3.13
gas concentration
amount of CO_2 and/or CO present expressed as parts per million or percent by volume

NOTE Parts per million (ppm) measurements can be expressed as parts per million (volume) (ppm_v).

3.14
test gas
synthetic air or nitrogen containing a known concentration of CO_2 and/or CO

3.15
portable apparatus
apparatus that has been designed to be carried readily from place to place and to be used while it is being carried

3.16
transportable apparatus
apparatus not intended to be portable but which can be readily moved from place to place

3.17
response time
t_{90}
time interval with the apparatus in a warmed-up condition, between the time when an instantaneous variation of the parameter to be measured is produced at the apparatus inlet, and the time when the response reaches and remains beyond 90 % of the final indication

3.18
sensor
assembly in which the sensing element is housed, and which can contain associated electronic components

3.19
indoor air quality apparatus
apparatus used to determine the condition of the air inside buildings, often used for analysing the efficiency of air filtration and ventilation systems

NOTE The apparatus can be designed to measure a number of different parameters such as gaseous composition, temperature, relative humidity and airborne contaminant levels.

3.20
electronic portable combustion gas analyser
electronic apparatus that will detect and measure the presence of combustion gases and display the result

3.21
warm up period
time taken for the apparatus to reach the manufacturer's specified operating performance from switch on, or following power failure in the case of mains powered equipment

4 General requirements

4.1 Construction

4.1.1 General

All parts of the apparatus, including the sensors and probe, shall be constructed of materials that will not be affected by vapours and gases or chemical substances typically found in the environment in which it is intended to be used [see 4.2.2 c)].

The apparatus shall conform to IP40, in accordance with EN 60529:1991, Clauses 12 and 14.

Adjustments that might affect the performance of the apparatus shall be suitably protected against unauthorized changes, such as through the use of passwords, tamper-evident seals or special tools.

4.1.2 Power supplies

Apparatus which derives its power from internal batteries may give a visual warning before the battery capacity falls to a point where either the apparatus sensitivity or the stated display accuracy falls outside the requirements. When this point is actually reached, a clear indication shall be given to alert the user and the display shall switch out of normal operational mode.

Apparatus provided with the means of connection to the mains supply shall conform to relevant EN standards.

NOTE This area is covered by various statutory regulations.

4.1.3 Indicators

4.1.3.1 Indicators shall be provided to show:

a) measured parameter, values and units of measurement;

b) low battery warning for battery-powered apparatus;

c) for aspirated apparatus with an integrated flow indicator, a warning when a blockage occurs (see 5.3.14);

d) mode of operation or apparatus status (e.g. warm-up and measurement);

e) when values lie outside the indicating range.

All values shall be indicated on a display with characters not less than 8 mm high, unless adequate provision is made for enhancing the legibility (e.g. backlighting), in which case the minimum character height shall be 4 mm.

For each separate parameter measured the apparatus shall display the value, the physical unit and parameter description. For a combination of parameters the display may switch automatically from one indication to another. If the display switches between information of simultaneous parameters it shall be clear and understandable. Displayed measured values shall be refreshed at intervals no greater than 3 s. If the apparatus is equipped with seven-segment displays it shall have a device or self testing function for checking the displays.

4.1.3.2 For aspirated apparatus, a means shall be provided to recognise and/or indicate the working mode of the pump (or a blockage of the gas path) by, for example:

- audible warning;
- visual indication; or
- flow measurement.

4.1.4 Range, resolution, accuracy and response time

4.1.4.1 Table 1 lists the different parameters covered by this European Standard. For each parameter given it specifies the:

- minimum indication range;
- maximum display resolution;
- accuracy of the apparatus;
- maximum response time.

4.1.4.2 The indication ranges are the minimum ranges for the apparatus. Higher ranges are allowed, but will not change the values for accuracy, resolution or response time.

Table 1 – Requirements for range, resolution, accuracy and response time

Parameter	Indication range ppm	Resolution	Accuracy	Response time (t_{90})
CO	0 to 100	1 ppm	± 3 ppm (≤ 20 ppm) ± 5 ppm (> 20 ppm)	≤ 50 s (aspirated apparatus) ≤ 120 s (diffusion apparatus)
CO_2 (low)	0 to 6 000	50 ppm	± 10 % of reading or ± 5 % of range, whichever is the greater	≤ 50 s (aspirated apparatus) ≤ 120 s (diffusion apparatus)
CO_2 (high)	> 6 000	100 ppm	± 10 % of reading or ± 5 % of range, whichever is the lesser	≤ 50 s (aspirated apparatus) ≤ 120 s (diffusion apparatus)

4.1.5 Printer or data transfer facility

When the apparatus is provided with a printer or data transfer facility, it shall print or communicate the date, time, measured parameter, values and units of measurement specified in 4.1.3 taken at the time of the measurement.