SLOVENSKI STANDARD
oSIST prEN 50104:2018

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Električne naprave za odkrivanje in merjenje kisika - Zahteve za delovanje in preskusne metode

Electrical apparatus for the detection and measurement of oxygen - Performance requirements and test methods

Elektrische Geräte für die Detektion und Messung von Sauerstoff - Anforderungen an das Betriebsverhalten und Prüfverfahren

Appareils électriques de détection et de mesure de l'oxygène - Exigences d'aptitude à la fonction et méthodes d'essai

Ta slovenski standard je istoveten z: **prEN 50104**

ICS:

13.320	Alarmni in opozorilni sistemi	Alarm and warning systems
29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres

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EUROPEAN STANDARD

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Electrical apparatus for the detection and measurement of oxygen - Performance requirements and test methods

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This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2018-12-07.

It has been drawn up by CLC/SC 31-9.

If this draft becomes a European Standard, CENELEC 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.

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

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

CENELEC

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

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European foreword

This document (prEN 50104:2018) has been prepared by CLC/TC 31, "*Electrical apparatus for potentially explosive atmospheres*".

This document is currently submitted to the CEN Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50104:2010.

The State of the Art is included in Annex A "Significant changes between this European Standard and EN 50104:2010" which lists all changes to EN 50104:2010.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EU Directive 2014/34/EU.

For the relationship with EU Directive(s), see informative Annex ZZ, which is an integral part of this document.

1 Scope

This document specifies general requirements for design, testing and performance, and describes the test methods that apply to portable, transportable and fixed equipment for the measurement of the oxygen concentration in gas mixtures indicating up to 25 % (v/v). The equipment, or parts thereof, may be intended for use in explosive atmospheres (see 4.1) and in mines susceptible to firedamp.

This document applies to equipment intended for monitoring oxygen deficiency and enrichment.

EXAMPLE Monitoring oxygen deficiency and/or enrichment includes:

— protection of human health and safety in potentially oxygen deficient atmospheres;

— fire protection by monitoring areas with reduced oxygen concentration;

— fire protection by monitoring oxygen concentrations exceeding that of normal ambient air.

This document also applies to equipment with an oxygen measuring function for explosion protection in the case of monitoring inertisation.

NOTE 1 Inertisation is an explosion protection technique where a potentially explosive atmosphere is purged with inert gas.

NOTE 2 Commonly used oxygen sensors in commercial equipment for industrial application are:

— electrochemical sensors (aqueous and solid electrolytes);

— paramagnetic sensors;

— zirconium dioxide sensors;

— tunable diode laser absorption spectroscopy sensors (TDLAS).

This document is applicable to equipment intended to measure reliably the oxygen concentration, to provide an indication, alarm or other output function, the purpose of which is to give a warning of a potential hazard and, in some cases, to initiate automatic or manual protective action(s), whenever the level exceeds or falls below an alarm set point.

This document is applicable to equipment, including integral sampling systems of aspirated equipment, intended to be used for commercial, industrial and non-residential safety applications.

This document does not apply to external sampling systems, or to equipment of laboratory or scientific type, or to medical equipment, or to equipment used only for process monitoring and/or control purposes. For equipment used for sensing the presence of multiple gases, this document applies only to the measurement of oxygen.

This document is also applicable to equipment using optical principles (e.g. TDLAS), where the optical transmitter and receiver or the optical transceiver (i.e. combined transmitter and receiver) and a suitable reflector are not located in a common enclosure. However, in this case it will be necessary to modify the test conditions described in Clause 5.3 and to introduce supplementary tests to Clause 5.4 of this standard. Such supplementary tests will include alignment, beam block fault, long range operation. Guidance to appropriate modification of the test conditions and supplementary tests may be taken from EN 60079-29-4. Modifications of the test conditions as well as modified and supplementary tests shall be agreed between the manufacturer and test laboratory and identified and described in the test report.

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.

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

EN 50271, *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)*

EN 60079-29-2, *Explosive atmospheres - Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen*

3 Definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Gas properties

3.1.1
ambient air
normal atmosphere surrounding the-equipment

3.1.2
poisons
<for sensing elements> substances that lead to temporary or permanent change of performance, particularly loss of sensitivity of the sensing element

3.1.3
reference air
air, under normal ambient conditions, with an oxygen concentration of (21 ± 0,4) % (v/v)

3.1.4
standard test gas
test gas with a composition specified for each item of equipment to be used for all tests unless otherwise stated

3.1.5
volume fraction (v/v)
quotient of the volume of a specified component and the sum of the volumes of all components of a gas mixture before mixing, all volumes referring to the pressure and the temperature of the gas mixture

Note 1 to entry: The volume fraction and volume concentration take the same value if, at the same state conditions, the sum of the component volumes before mixing and the volume of the mixture are equal. However, because the mixing of two or more gases at the same state conditions is usually accompanied by a slight contraction or, less frequently, a slight expansion, this is not generally the case.

3.1.6
zero test gas
gas, such as nitrogen, which is free of oxygen, and interfering and contaminating substances

3.2 Types of equipment

3.2.1
alarm-only equipment
equipment with an alarm but not having an indication of measured value

3.2.2
aspirated equipment
equipment that samples the gas by drawing it to the gas sensor

Note 1 to entry: A hand operated or electric pump is often used to draw gas to the sensor.

3.2.3
automatically aspirated equipment
aspirated equipment with an integral pump or separate pump, which is connected directly to the equipment

3.2.4
continuous duty equipment
equipment that is powered for long periods of time, but may have either continuous or intermittent sensing

Note 1 to entry: Within this standard, all equipment is regarded as continuous duty.

3.2.5
diffusion equipment
equipment in which the transfer of gas from the atmosphere to the sensor takes place without aspirated flow

3.2.6
fixed equipment
equipment fastened to a support, or otherwise secured in a specific location when energized

3.2.7
portable equipment
equipment intended to be carried by a person during operation

Note 1 to entry: Portable equipment is battery powered and includes, but is not limited to

a) hand-held equipment, typically less than 1 kg, which requires use of only one hand to operate,

b) personal monitors, similar in size and mass to the hand-held equipment, that are continuously operating (but not necessarily continuously sensing) while they are attached to the user, and

c) larger equipment that can be operated by the user while it is carried either by hand, by a shoulder strap or carrying harness and which may or may not have a hand directed probe.

3.2.8
transportable equipment
equipment not intended to be carried by a person during operation, nor intended for fixed installation

3.2.9
gas detection transmitter
fixed gas detection equipment that provide a conditioned electronic signal or output indication to a generally accepted industry standard (such as 4-20 mA), intended to be utilized with separate gas detection control units, or signal processing data acquisition, central monitoring and similar systems which typically process information from various locations and sources including, but not limited to, gas detection equipment

3.2.10
gas detection control unit
equipment intended to provide indications on a display, alarm functions, output contacts and/or alarm signal outputs or any combinations when operated with remote sensor(s)

3.2.11
separate gas detection control unit
equipment intended to provide indications on a display, alarm functions, output contacts and/or alarm signal outputs or any combination when operated with gas detection transmitter(s)

3.2.12
equipment with integral sensor(s)
equipment that provides indications on a display, alarm functions, output contacts and/or alarm signal outputs using a sensor which is within or directly mounted to the equipment housing

3.2.13
accessory
component which can be fitted to the equipment for special purpose

EXAMPLE External gas pump, sampling probe, hoses, collecting cone, weather protection device

3.3 Sensors

3.3.1
sensing element
part of the sensor which is sensitive to the gas/vapour to be measured

3.3.2
sensor
assembly in which the sensing element is housed and that may also contain associated circuit components

3.3.3
integral sensor
sensor which is within or directly assembled to the equipment housing

3.3.4
remote sensor
sensor which is installed separately, but is electrically connected to a gas detection control unit, gas detection transmitter, or to transportable or portable equipment

3.3.5
measuring principle
type of physical or physico-chemical detection principle and the measurement procedure to determine the measured value

3.4 Supply of gas to equipment

3.4.1
sample line
means by which the gas being sampled is conveyed to the sensor

Note 1 to entry: Accessories such as filter or water trap are often included in the sample line.

3.4.2
sampling probe
separate accessory sample line which is optionally attached to the equipment

Note 1 to entry: It is usually short (e.g. of the order of 1 m) and rigid, although it can be telescopic. In some cases it is connected by a flexible tube to the equipment.

3.4.3
field calibration kit
means of presenting test gas to the equipment for the purpose of calibrating/adjusting or verifying the operation of the equipment

Note 1 to entry: The field calibration kit can be used for verifying the operation of the alarms if the concentration of the test gas is beyond the alarm set-point.

Note 2 to entry: A mask for calibration and test (see 3.4.4) is an example of a field calibration kit.

3.4.4
mask for calibration and test
device that can be attached to the equipment to present a test gas to the sensor in a reproducible manner

3.5 Signals and alarms

3.5.1
alarm set point
setting of the equipment at which the measured concentration will cause the equipment to initiate an indication, alarm or other output function

3.5.2
latching alarm
alarm that, once activated, requires deliberate action to be deactivated

3.5.3
fault signal
audible, visible or other type of output, different from the alarm signal, permitting, directly or indirectly, a warning or indication that the equipment is not working satisfactorily

3.5.4
repeatability
closeness of agreement between the results of successive measurements of the same measurand, carried out under the same conditions of measurement, i.e.:

– by the same measurement procedure,

– by the same observer,

– with the same measuring instruments, used under the same conditions,

– in the same laboratory,

– at relatively short intervals of time.

3.5.5
special state
any state of the equipment other than those in which monitoring of gas concentration and/or alarming is the intent

Note 1 to entry: Special state includes warm-up, calibration mode or fault condition.

3.5.6
measured value
calculated oxygen concentration that results from processing the sensor signal

Note 1 to entry: The measured value may be further processed before indication on output or display (e.g. suppression of indication).

3.5.7
indication
representation of the measured value on an output or display

Note 1 to entry: The indication may be affected by suppression or filtering of the measured value.

3.6 Times

3.6.1
drift
variation in the equipment indication with time, at any fixed gas volume fraction under constant ambient conditions

3.6.2
final indication
indication given by the equipment after stabilisation

3.6.3
stabilisation
state when three successive readings of an equipment at a constant gas volume fraction, taken at 2 min intervals or twice the respective *t(90)*, whichever is less, indicates no changes greater than ±1 % of the measuring range

3.6.4
time of response *t(x)*
time interval, with the equipment in a warmed-up condition, between the time when an instantaneous variation in volume fraction is produced at the equipment inlet and the time when the response reaches a stated percentage *(x)* of the difference between the initial and the final indication

3.6.5
warm-up time
time interval, with the equipment in a stated atmosphere, between the time when the equipment is switched on and the time when the indication reaches and remains within the stated tolerances

Note 1 to entry: see Figure 1