

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

The European Standard EN 50104:2002, with the incorporation of amendment A1:2004, has the status of a British Standard

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National foreword

This British Standard is the official English language version of EN 50104:2002 including amendment A1:2004. It supersedes BS EN 50104:1999 which will be withdrawn on 30 June 2003.

The UK participation in its preparation was entrusted by Technical Committee GEL/31, Electrical apparatus for explosive atmospheres, to Subcommittee GEL/31/19, Gas detectors, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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**Electrical apparatus for the detection and measurement of oxygen -
Performance requirements and test methods**
(includes amendment A1:2004)

Appareils électriques de détection
et de mesure de l'oxygène -
Règles de performance
et méthodes d'essai
(inclut l'amendement A1:2004)

Elektrische Geräte für die Detektion
und Messung von Sauerstoff -
Anforderungen an das Betriebsverhalten
und Prüfverfahren
(enthält Änderung A1:2004)

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This third edition of the European Standard was prepared by SC 31-9, Electrical apparatus for the detection and measurement of combustible gases to be used in industrial and commercial potentially explosive atmospheres, of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres, on the basis of EN 50104:1998.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50104 on 2002-02-01.

This European Standard supersedes EN 50104:1998.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
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- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-02-01

Annexes designated „informative“ are given for information only.
In this standard, Annexes A and B are informative.

Foreword to amendment A1

This amendment to the European Standard EN 50104:2002 was prepared by SC 31-9, Electrical apparatus for the detection and measurement of combustible gases to be used in industrial and commercial potentially explosive atmospheres, of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres.

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1 Scope

This European Standard specifies test methods and performance requirements for portable, transportable and fixed electrical apparatus for the measurement of the oxygen concentration in gas mixtures indicating up to 25 % (v/v).

In the case of inert gas purging (inertization), it applies also to apparatus with an oxygen measuring function for explosion protection.

NOTE The most commonly used oxygen sensors in commercial equipment for industrial application are:

- a) paramagnetic sensors;
- b) electrochemical sensors (aqueous and solid electrolytes).

This European Standard is applicable to oxygen alarm apparatus 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 a preselected alarm concentration.

It is applicable to apparatus, including integral sampling systems of aspirated apparatus, intended to be used for commercial and industrial safety applications.

It does not apply to external sampling systems, or to apparatus of laboratory or scientific type, or to medical equipment, or to apparatus used only for process control purposes.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50270	1999	Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen
EN 50271	2001	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	1995	Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:1995 + corrigendum March 1995)

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 Gas properties

3.1.1

ambient air

normal atmosphere surrounding the apparatus

3.1.2

poisons (of sensors)

substances which lead to temporary or permanent loss of sensitivity of the sensors

3.1.3

reference air

air, under normal ambient conditions, with an oxygen concentration of $(21 \pm 0,4) \%$ (v/v)

3.1.4

standard test gas

test gas with a composition specified for each apparatus to be used for all tests unless otherwise stated (see 5.3.2)

3.1.5

volume ratio (v/v)

ratio of the volume of a component gas to the volume of the gas mixture under specified conditions of temperature and pressure

3.1.6

zero test gas

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

3.2 Types of instruments

3.2.1

alarm-only apparatus

apparatus having an alarm but not having a meter or other indicating device that would allow measurement of the deviations permitted by the requirements of the appropriate chapters of this European Standard

3.2.2

aspirated apparatus

apparatus that obtains the gas by drawing it to the gas sensor, for example, by means of a hand-operated or electric pump

3.2.3

continuous-duty apparatus

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

3.2.4

cyclically operated apparatus

apparatus that senses several measuring points at time intervals

3.2.5

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 not aspirated flow

3.2.6

fixed apparatus

apparatus that is intended to have all parts permanently installed at a given location

3.2.7

oxygen alarm apparatus

portable, transportable or fixed apparatus to monitor the oxygen concentration in gas mixtures, which measures autonomously and continuously or cyclically, warns and optionally switches, indicates, registers and stores

3.2.8

portable apparatus

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

A portable apparatus is battery powered and includes, but is not limited to

- a) a hand-held apparatus, typically less than 1 kg, suitable for one-handed operation without accessories (such as sampling probes, sample lines) fitted,
- b) personal monitors, similar in size and mass to the hand-held apparatus, that are continuously operating (but not necessarily continuously sensing) while they are attached to the user, and
- c) another apparatus that can be operated by the user while it is carried either by hand, or by a means of a shoulder strap or carrying harness, and which may or may not have a hand-directed probe

3.2.9

spot-reading apparatus

apparatus intended to operate for periods of only a few minutes for irregular intervals

3.2.10

transportable apparatus

apparatus not intended to be portable, but which can be moved readily from one place to another

3.3 Sensors

3.3.1

integral sensor

sensor which is integral to the main body of the apparatus

3.3.2

measuring principle

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

3.3.3

remote sensor

sensor which is not integral to the main body of the apparatus

3.3.4

sensing element

part of the sensor which directly picks up the quantity to be measured and which is sensitive to that quantity

3.3.5

sensor

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