

Electrical apparatus for the detection and measurement of combustible gases —

General requirements and test methods

The European Standard EN 50054:1991, with the incorporation of amendment A1:1995, has the status of a British Standard

Cooperating organizations

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Contents

	Page
Cooperating organizations	Inside front cover
National foreword	ii
Foreword	2
Text of EN 50054	7
National appendix NA (informative)	32
National appendix NB (informative)	32

National foreword

This British Standard has been prepared under the direction of the Electronic Equipment Standards Policy Committee and is the English language version of EN 50054, “*Electrical apparatus for the detection and measurement of combustible gases. General requirements and test methods*”, including amendment A1:1995. This British Standard supersedes BS 6020-1:1981, which is withdrawn.

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given for information only. National appendices are designated “informative”.

Cross-references

Details of international standards quoted in this British Standard for which there is an identical or technically equivalent British Standard are given in National appendix NB.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 32, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

Electrical apparatus for the detection and measurement of combustible gases General requirements and test methods

(includes amendment A1:1995)

Appareils électriques de détection et de mesure
des gaz combustibles
Règles générales et méthodes d'essais
(inclut l'amendement A1:1995)

Elektrische Geräte für das Aufspüren und die
Messung brennbarer Gase
Allgemeine Anforderungen und Prüfmethoden
(enthält Änderung A1:1995)

This European Standard was approved by CENELEC on 10 December 1990, amendment A1 was approved by CENELEC on 1995-03-06. 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.

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Foreword

This European Standard has been prepared by the CENELEC Subcommittee SC 31-9, Gas detectors.

The text of the draft was approved by CENELEC as EN 50054 on 10 December 1990.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1991-12-01
- latest date of withdrawal of conflicting national standards (dow) 1991-12-01

For products which have complied with the relevant national standard before 1991-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1996-12-01.

Foreword to amendment A1

This amendment 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.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 50054:1991 on 1995-03-06.

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Contents

	Page
IEC Publications referred to in European Standard EN 50054	4
ISO Standards referred to in European Standard EN 50054	4
European Standards referred to in European Standard EN 50054	4
1 Scope	7
2 Definitions	7
3 General requirements	10
3.1 Introduction	10
3.2 Construction	10
3.2.1 General	10
3.2.2 Indicating devices	10
3.2.3 Alarm or output functions	11
3.2.4 Fault signals	11
3.2.5 Adjustments	11
3.2.6 Battery-powered apparatus	11
3.3 Labelling and marking	11
3.3.1 General	11
3.3.2 Identification of the calibration gas for Group II apparatus	12
3.4 Instruction manual	12
4 Test requirements	13
4.1 Introduction	13
4.2 General requirements for tests	13
4.2.1 Samples and sequence of tests	13
4.2.2 Preparations of apparatus before testing	13
4.2.3 Mask for calibrations and tests	14
4.3 Normal conditions for test	14
4.3.1 General	14
4.3.2 Test gases	14
4.3.3 Standard test gas	14
4.3.4 Flow rate for test gases	14
4.3.5 Voltage	14
4.3.6 Ambient temperature	14
4.3.7 Pressure	15
4.3.8 Humidity	15
4.3.9 Stabilization time	15
4.3.10 Orientation	15
4.4 Test methods	15
4.4.1 General	15
4.4.2 Unpowered storage	15
4.4.3 Calibration and adjustment	15

	Page		Page
4.4.4 Drift (continuous duty apparatus)	15	Figure 1 — Warm-up time in clean air	9
4.4.5 Drift (spot-reading apparatus)	16	Figure 2 — Warm-up time in standard test gas	9
4.4.6 Alarm set point(s)	16	Figure 3 — Schematic example of equipment for use with aspirated apparatus	28
4.4.7 Temperature	16	Figure 4 — Schematic example of equipment during application of clean air or test gas	29
4.4.8 Pressure	16	Figure 5 — Schematic example of equipment showing change-over from clean air to test gas to begin the time of response measurement	29
4.4.9 Humidity	16	Figure 6 — Schematic example of applicator and sensor inlet during application of test gas or clean air	30
4.4.10 Air speed	16	Figure 7 — An example of an automated test chamber	31
4.4.11 Pumping rate	17		
4.4.12 Orientation	17		
4.4.13 Vibration (applicable to Group I machine-mounted apparatus and to Group II fixed and transportable apparatus)	17		
4.4.14 Drop test (applicable to portable apparatus and remote sensors)	17		
4.4.15 Warm-up time (not applicable to spot-reading apparatus)	17		
4.4.16 Time of response (not applicable to spot-reading apparatus)	17		
4.4.17 Minimum time of operation (spot-reading apparatus)	17		
4.4.18 High gas concentrations above the measuring range	18		
4.4.19 Battery capacity	18		
4.4.20 Power supply variations	18		
4.4.21 Power supply interruptions, voltage transients and step changes of voltage	18		
4.4.22 Addition of sampling probe	19		
4.4.23 Dust (applicable to Group I apparatus only)	19		
4.4.24 Poisons and other gases	19		
4.4.25 Electromagnetic immunity	19		
5 Field calibration kit	19		
Annex A Flammability limits (i.e. LEL and UEL) of some flammable gases and vapours	20		
Annex B Determination of time of response	24		
Annex C Breathing and draining devices which form part of a flameproof enclosure	24		
Annex D Tests of flameproof enclosures with breathing and draining devices	26		
Annex E Additional requirements for crimped ribbon elements of breathing and draining devices	27		
Annex F Additional requirements for elements, with non-measurable paths, of breathing and draining devices	27		

IEC publications referred to in european standard EN 50054

IEC 79-10 (1986)	Electrical apparatus for explosive atmospheres Part 10. Classification of hazardous areas
IEC 79-14 (1984)	Electrical apparatus for explosive atmospheres Part 14. Electrical installations in explosive gas atmospheres (other than mines)
IEC 801-4 (1988)	Electromagnetic compatibility for industrial-process measurement and control equipment Part 4. Electrical fast transient/burst requirements

ISO standards referred to in european standard EN 50054

ISO 2738 (1987)	Permeable sintered metal materials — Determination of density, oil content, and open porosity
ISO 4003 (1977)	Permeable sintered metal materials — Determination of bubble test pore size
ISO 4022 (1987)	Permeable sintered metal materials — Determination of fluid permeability
ISO 6142 (1981)	Gas analysis — Preparation of calibration gas mixtures — Weighing methods Addition 1 (1983)
ISO 6145 (1986)	Gas analysis — Preparation of calibration gas mixtures — Dynamic volumetric methods Parts 1, 3, 4 and 6
ISO 6146 (1979)	Gas analysis — Preparation of calibration gas mixtures — Manometric methods
ISO 6147 (1979)	Gas analysis — Preparation of calibration gas mixtures — Saturation methods

European standards referred to in european standard EN 50054

EN 50014 (1977)	Electrical apparatus for potentially explosive atmospheres. General requirements Amendment No. 1 (July 1979) Amendment No. 2 (June 1982) Amendment No. 3 (December 1982) Amendment No. 4 (December 1982) Amendment No. 5 (February 1986)
EN 50015 (1977)	Electrical apparatus for potentially explosive atmospheres. Oil immersion “o” Amendment No. 1 (July 1979)
EN 50016 (1977)	Electrical apparatus potentially explosive atmospheres. Pressurized apparatus “p” Amendment No. 1 (July 1979)
EN 50017 (1977)	Electrical apparatus for potentially explosive atmospheres. Powder filling “q” Amendment No. 1 (July 1979)
EN 50018 (1977)	Electrical apparatus for potentially explosive atmospheres. Flameproof enclosure “d” Amendment No. 1 (July 1979) Amendment No. 2 (December 1982) Amendment No. 3 (November 1985)
EN 50019 (1977)	Electrical apparatus for potentially explosive atmospheres. Increased safety “e” Amendment No. 1 (July 1979) Amendment No. 2 (September 1983) Amendment No. 3 (December 1985)
EN 50020 (1977)	Electrical apparatus for potentially explosive atmospheres. Intrinsic safety “i” Amendment No. 1 (July 1979) Amendment No. 2 (December 1985)
EN 50028 (1986)	Electrical apparatus for potentially explosive atmospheres. Encapsulation “m”

EN 50039 (1980)	Electrical apparatus for potentially explosive atmospheres. Intrinsically safe electrical systems “i”
EN 50055 (1991)	Electrical apparatus for the detection and measurement of combustible gases. Performance requirements for Group I apparatus indicating up to 5 % (V/V) methane in air
EN 50056 (1991)	Electrical apparatus for the detection and measurement of combustible gases. Performance requirements for Group I apparatus indicating up to 100 % (V/V) methane
EN 50057 (1991)	Electrical apparatus for the detection and measurement of combustible gases. Performance requirements for Group II apparatus indicating up to 100 % lower explosive limit
EN 50058 (1991)	Electrical apparatus for the detection and measurement of combustible gases. Performance requirements for Group II apparatus indicating up to 100 % (V/V) gas
HD 323.2.6 S2	Basic environmental testing procedures Part 2. Tests Test Fc and guidance. Vibration (sinusoidal)
HD 481.1 S1	Electromagnetic compatibility for industrial-process measurement and control equipment Part 1. General introduction (IEC 801-1:1984)
HD 481.3 S1	Electromagnetic compatibility for industrial-process measurement and control equipment Part 3. Radiated electromagnetic field requirements (IEC 801-3:1984)

1 Scope

1.1 This European Standard specifies general requirements for construction and testing and describes the test methods that apply to portable, transportable and fixed apparatus for the detection and measurement of combustible gas or vapour concentrations with air. The apparatus, or parts thereof, is intended for use in potentially explosive atmospheres (see 2.1) and in mines susceptible to firedamp. This European Standard is supplemented by the following European Standards, concerning the specific requirements for performance of the various types of apparatus:

EN 50055, *Performance requirements for Group I apparatus indicating up to 5 % (V/V) methane in air.*

EN 50056, *Performance requirements for Group I apparatus indicating up to 100 % (V/V) methane.*

EN 50057, *Performance requirements for Group II apparatus indicating up to 100 % lower explosive limit.*

EN 50058, *Performance requirements for Group II apparatus indicating up to 100 % (V/V) gas.*

NOTE 1 This European Standard, in association with those referred to above, is intended to provide for the supply of apparatus giving a basic or minimum level of safety and performance suitable for general purpose applications. However, for specific applications a prospective purchaser (or an appropriate Authority) may additionally require apparatus to be submitted to particular tests or approval. For example, Group I apparatus (i.e. that to be used in mines susceptible to firedamp) is not permitted to be used without the additional and prior approval of the relevant Authority in mines under its jurisdiction. Such particular tests/approval are to be regarded as additional to and separate from the provisions of the European Standards referred to above and do not preclude certification to or compliance with these standards.

NOTE 2 Group I apparatus indicating up to 100 % (V/V) methane and Group II apparatus indicating up to 100 % (V/V) gas are suitable for use only with the specific gases for which they have been calibrated.

NOTE 3 For the purposes of this European Standard the term "combustible gas" includes combustible vapours.

NOTE 4 Attention is drawn to IEC Publication 79-10 which provides guidance on the classification of non-mining areas where flammable gas or vapour risks may arise. Group II electrical apparatus for use in such areas can be selected with IEC Publication 79-14.

1.2 This European Standard is applicable to combustible gas detection apparatus intended to provide an indication, alarm and/or other output function, the purpose of which is to give a warning of potential explosion hazard and in some cases to initiate automatic or manual protective actions.

1.3 This European Standard is applicable to apparatus, including the integral sampling systems of aspirated apparatus, intended to be used for commercial and industrial safety applications.

1.4 This European Standard does not apply to external sampling systems, or to apparatus of the laboratory or scientific types, or to apparatus used only for process control purposes.

2 Definitions

The following definitions are applicable in this European Standard and in the European Standards listed in 1.1.

2.1 potentially explosive atmosphere

an atmosphere which could become explosive (the danger is a potential one)

2.2 firedamp

a flammable gas, consisting mainly of methane, found naturally in mines

2.3 explosive gas atmosphere

a mixture with air, under normal atmospheric conditions, of flammable materials in the form of gas, vapour or mist, in which, after ignition, combustion spreads throughout the unconsumed mixture

NOTE 1 This definition specifically excludes dusts and fibres in suspension in air. Mists, though included in the definition are not covered by this European Standard.

NOTE 2 Although a mixture which has a concentration above the upper explosive limit (see 2.5) is not an explosive atmosphere, in certain cases for area classification purposes it is advisable to consider it as an explosive gas atmosphere.

NOTE 3 Normal atmospheric conditions include variations above and below reference levels of 101.3 kPa (1013 mbar) and 20 °C provided the variations have negligible effect on the explosion properties of the flammable materials.

2.4 lower explosive limit (LEL)

the volume ratio of flammable gas or vapour in air below which an explosive gas atmosphere will not be formed (See Annex A.)

2.5 upper explosive limit (UEL)

the volume ratio of flammable gas or vapour in air above which an explosive gas atmosphere will not be formed (see also note 2 to 2.3) (See Annex A.)

2.6 type of protection

the measures applied in the construction of electrical apparatus to prevent ignition of the surrounding explosive atmosphere by such apparatus (see 3.1.2)

2.7**Group I apparatus**

electrical apparatus for mines susceptible to firedamp

2.8**Group II apparatus**

electrical apparatus for places with a potentially explosive atmosphere, other than mines susceptible to firedamp

2.9**fixed apparatus**

an apparatus which is intended to have all parts permanently installed

2.10**transportable apparatus**

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

2.11**portable apparatus**

spot-reading or continuously sensing apparatus that has been designed to be readily carried from place to place and to be used whilst being carried. Portable apparatus is battery powered and includes, but is not limited to:

- a) hand-held apparatus, typically less than 1 kg, suitable for single-handed operation;
- b) personal monitors, similar in size and mass to the hand-held apparatus, that are continuously operating (but not necessarily continuously sensing) whilst attached to the user; and
- c) larger apparatus up to 5 kg that can be operated by the user whilst suspended by hand, by a shoulder strap or by a carrying harness; it may or may not have a hand directed probe.

2.12**continuous duty apparatus**

combustible gas detecting apparatus which are continuously powered but may have continuous or intermittent sensing

2.13**spot-reading apparatus**

an apparatus intended to be used for short periods of time as required

2.14**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 European Standards listed in 1.1

2.15**sensor**

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

2.16**remote sensor**

a sensor which is not integral with the main body of the apparatus

2.17**diffusion apparatus**

an apparatus in which the transfer of gas from the atmosphere to the gas sensor takes place by diffusion, i.e. there is no aspirated flow

2.18**aspirated apparatus**

combustible gas detecting apparatus which obtain the gas by drawing it to the gas sensor, for example by means of a hand operated or electric pump

2.19**sample line**

the pipeline by means of which the gas being sampled is conveyed to the sensor

2.20**sampling probe**

a separate sample line that may or may not be supplied with the apparatus, which is attached to the apparatus as required. It is usually short (e.g. of the order 1 m) and rigid (e.g. it may be telescopic), but may be connected by a flexible tube to the apparatus

2.21**special tool**

a tool required to gain access to, or to adjust, controls. The design of the tool is intended to discourage unauthorized interference with the apparatus

2.22**fault signal**

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

2.23**latching alarm**

an alarm which, once activated, requires deliberate action to deactivate it

2.24**ambient air**

the normal atmosphere surrounding the apparatus