BRITISH STANDARD

BS EN
50057:1999

Electrical apparatus for the detection and measurement of combustible gases — Performance requirements for Group II apparatus indicating up to 100 % lower explosive limit

The European Standard EN 50057:1998 has the status of a British Standard

ICS 13.320

National foreword

This British Standard is the English language version of EN 50057:1998. It supersedes BS EN 50057:1991 which is withdrawn.

The 1998 edition of the European Standard incorporates some minor modifications to bring it into alignment with the New Approach Directive on Potentially Explosive Atmospheres (ATEX). There are no changes to the technical provisions.

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 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.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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English version

Electrical apparatus for the detection and measurement of combustible gases — Performance requirements for Group II apparatus indicating up to 100 % lower explosive limit

Appareils électriques de détection et de mesure des gaz combustibles — Règles de performance des appareils du Groupe II pouvant indiquer jusqu'à 100 % de la limite inférieure d'explosivité

Elektrische Geräte für das Aufspüren und die Messung brennbarer Gase — Anforderungen an das Betriebsverhalten von Geräten der Gruppe II mit einem Meßbereich bis zu 100 % der unteren Explosiongrenze

This European Standard was approved by CENELEC on 1 April 1998.

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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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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 European Standard has been prepared by the CENELEC Subcommittee 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 approved by CENELEC as EN 50057 on 1990-12-10. The CENELEC Technical Board approved the publication of a new edition on 1998-04-01 (D95/079).

This European Standard replaces EN 50057:1991.

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) 1999-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1999-01-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and covers essential requirements of EC Directive 94/9/EC.

Contents

		Page
Foreword		2
1	Scope	3
2	Normative references	3
3	Definitions	3
4	General requirements	3
5	Performance requirements	3
5.1	General	3
5.2	Unpowered storage	3
5.3	Calibration curve (not applicable to alarm-only apparatus)	3
5.4	Drift (continuous duty apparatus)	3
5.5	Drift (spot reading apparatus)	3
5.6	Alarm	3
5.7	Temperature	4
5.8	Pressure	4
5.9	Humidity	4
5.10	Air speed	4
5.11	Pumping rate	4
5.12	Orientation	4
5.13	Vibration (fixed and transportable apparatus)	4
5.14	Drop test (applicable to portable apparatus and remote sensors)	4
5.15	Warm-up time (not applicable to spot-reading apparatus)	4
5.16	Time of response (not applicable to spot-reading apparatus)	4
5.17	Minimum time of operation (spot-reading apparatus)	4
5.18	High gas concentrations above the measuring range	4
5.19	Battery capacity	5
5.20	Power supply variations	5
5.21	Power supply interruptions, voltage transients and step changes of voltage	5
5.22	Addition of sampling probe	5
5.23	Dust	5
5.24	Poisons and other gases	5
5.25	Electromagnetic immunity	5
6	Field calibration kit	5
7	Information for use	5

1 Scope

1.1 This European Standard specifies performance requirements for Group II (as defined in EN 50054) portable, transportable and fixed apparatus for the detection and measurement of combustible gas or vapour concentrations with air. The apparatus, or parts thereof, may be installed or used in potentially explosive atmospheres, other than mines susceptible to firedamp (i.e. Group I). The general requirements and test methods applicable to the apparatus covered by this European Standard are specified in EN 50054.

1.2 This European Standard is restricted to apparatus intended for the detection and measurement of combustible gas or vapour concentrations with air up to 100 % lower explosive limit (LEL).

NOTE Although apparatus of the types covered by this European Standard may be suitable for detecting a wide range of combustible gases, particular gases (e.g. methane or propane) are specified in EN 50054 as the components of the test gases for the purpose of practical convenience. The performance requirements specified in this European Standard must therefore be regarded with caution when the apparatus is used to detect other combustible gases, as some parameters — such as speed of response — will be modified.

2 Normative references

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

EN 50054:1998, *Electrical apparatus for the detection and measurement of combustible gases — General requirements and test methods.*

3 Definitions

For the purposes of this European Standard, the definitions given in EN 50054 apply.

4 General requirements

The apparatus shall comply with the general requirements specified in clause **4** of EN 50054 and with the performance requirements specified in clause **5** of this European Standard.

Compliance shall be determined in accordance with the appropriate test requirements and methods, including initial calibration, specified in EN 50054.

5 Performance requirements

5.1 General

The normal conditions for test are specified in subclause **5.3** of EN 50054. Compliance shall be determined in accordance with the test methods specified in subclause **5.4** of EN 50054.

5.2 Unpowered storage

After being submitted to the conditions specified in subclause **5.4.2** of EN 50054, the apparatus shall meet the requirements specified in **5.3** to **5.25** of this European Standard.

5.3 Calibration curve (not applicable to alarm-only apparatus)

5.3.1 *Calibration curve*

After initial adjustment with the standard test gas, each of the three indications (after correction using the manufacturer's calibration curves, if necessary) shall not differ from these true volume ratios by more than ± 5 % of the measuring range or ± 10 % of the indications whichever is the greater.

5.3.2 *Response to gases other than the test gas*

The apparatus indication (after correction using the manufacturer's calibration curves, if necessary) obtained for each of three gas volume ratios of each gas tested shall not differ from these volume ratios by more than ± 7 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.4 Drift (continuous duty apparatus)

Continuous duty apparatus shall comply with the following requirements.

a) Short term drift. The short term variation shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater.

b) Long term drift. The long term variation shall not exceed ± 10 % of the measuring range or ± 30 % of the indication, whichever is the greater.

5.5 Drift (spot reading apparatus)

The variation shall not exceed ± 3 % of the measuring range or ± 10 % of the readings, whichever is the greater.

5.6 Alarm

The alarm shall operate during every cycle of the test. If a latching alarm is provided, the manual reset action shall be checked during every cycle.

5.7 Temperature

The variation of the indication from that at 20 °C, over the specified temperature ranges, shall not exceed the following:

a) For apparatus with integral sensors or for portable or transportable apparatus, where the control unit and sensor are used in the same general environment the variation over the temperature range − 10 °C to + 40 °C shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater.

b) For apparatus with remote sensors, where the control unit and sensor are not used in the same general environment the following temperature ranges shall be applied for sensors and control units.

1) Sensors. With the control unit under normal ambient test conditions, the sensor shall be tested in air and in the standard test gas over the temperature range − 25 °C to + 55 °C. The variation shall not exceed ± 7 % of the measuring range or ± 15 % of the indication, whichever is the greater.

2) Control units. With the sensor under normal ambient test conditions, the variation over the temperature range + 5 °C to + 55 °C shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater.

5.8 Pressure

The variation of the indication from that at 101,3 kPa, over a pressure range of 95 kPa to 110 kPa, shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.9 Humidity

The variation of the indication from that at 55 % relative humidity (r.h.) over a humidity range of 5 % to 90 % r.h. at ± 40 °C, shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.10 Air speed

The variation of the indication shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.11 Pumping rate

The variation of the indication shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.12 Orientation

The variation of the indication shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.13 Vibration (fixed and transportable apparatus)

During the vibration test, the apparatus shall not suffer any loss of function and shall not give a false alarm or fault signal. The apparatus shall not suffer damage resulting in hazard or loss of function.

At the conclusion of the vibration test and after the apparatus sensor has then been exposed to clean air followed by the standard test gas mixture, the deviation of the indication from that determined prior to the test shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.14 Drop test (applicable to portable apparatus and remote sensors)

The apparatus shall not suffer damage resulting in hazard or loss of function.

The variation of the indication shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.15 Warm-up time (not applicable to spot-reading apparatus)

5.15.1 ***Fixed and transportable apparatus***

The apparatus shall warm-up in clean air to indicate zero to within ± 5 % of the measuring range in a time not exceeding the warm-up time in clean air, as stated by the manufacturer, and no false alarm shall be generated.

5.15.2 ***Continuous duty portable apparatus***

The apparatus shall warm-up in clean air to indicate zero to within ± 5 % of the measuring range in a time not exceeding 60 s, and no false alarms shall be generated.

5.16 Time of response (not applicable to spot-reading apparatus)

The time of response t_{50} shall not be greater than 10 s, and t_{90} shall not be greater than 30 s.

5.17 Minimum time of operation (spot-reading apparatus)

For apparatus without probe or sample line, the indication shall indicate 90 % of the final value in a time not exceeding 15 s.

For aspirated apparatus, using a sample line or probe length of not more than 3 m, the indication shall indicate 90 % of the final indication in a time not exceeding 30 s.

5.18 High gas concentrations above the measuring range

5.18.1 ***Non-ambiguity test***

When tested in accordance with **5.4.18.2** of EN 50054, all gas concentrations above full scale shall be indicated by a full scale meter indication and, where fitted, an alarm. If the indication is digital, a clear indication shall be given that the upper limit of the measuring range has been exceeded.

5.18.2 ***Residual effect test***

The variations of the indications from those recorded in clean air and in the standard test gas at the beginning of the test, shall not exceed ± 5 % of the measuring range or ± 15 % of the indication, whichever is the greater.

5.19 Battery capacity

5.19.1 ***Portable continuous duty apparatus***

The variation shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater, at the end of the 8 h or 10 h period as appropriate.

At the end of the further 15 min following the indication of low battery condition, the variation shall not exceed ± 6 % of the measuring range or ± 20 % of the indication, whichever is the greater.

5.19.2 ***Portable spot-reading apparatus***

The variation shall not exceed ± 3 % of the measuring range or ± 10 % of the indication whichever is the greater, at the end of 200 operations.

After a further 10 operations following the indication of low battery condition, the variation shall not exceed ± 6 % of the measuring range or ± 20 % of the indication, whichever is the greater.

5.20 Power supply variations

5.20.1 ***A.C. powered apparatus***

The variation of the indication shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater.

5.20.2 ***External d.c. powered apparatus***

The variation of the indication shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater.

5.20.3 ***Apparatus with other power supplies***

The variation of the indication shall not exceed ± 3 % of the measuring range or ± 10 % of the indication, whichever is the greater. In the case of battery powered apparatus, these limits shall apply when the apparatus is subjected to a change from the maximum terminal voltage of a new or fully charged battery to the minimum recommended operating voltage of that battery as determined by the built-in battery condition indicator.

5.21 Power supply interruptions, voltage transients and step changes of voltage

The apparatus shall not yield spurious alarms when an interruption, voltage transient or step change of voltage occurs.

5.22 Addition of sampling probe

The variation of the indication shall not exceed ± 2 % of the measuring range or ± 5 % of the indication, whichever is the greater.

5.23 Dust

Not applicable.

5.24 Poisons and other gases

Not applicable.

5.25 Electromagnetic immunity

When subjected to the electromagnetic immunity test) the variation shall not exceed ± 3 % of the measuring range) or ± 10 % of the indication, whichever is the greater. The apparatus shall suffer no loss of function nor spurious alarm.

6 Field calibration kit

The meter or output indication observed during the use of the field calibration kit in a manner corresponding to the manufacturer's instruction, shall not differ from the correct indication by more than ± 5 % of the measuring range.

7 Information for use

It shall be verified that the contents of the instruction manual are in accordance with the requirements specified in EN 50054.

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