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

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

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

[SIST EN 50057:2000](https://standards.itih.ai/catalog/standards/sist/b81c06ed-e5f0-4c70-a8d4-11e9021b094e-50057-2000)

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

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SIST EN 50057:2000**en**

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English version

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and measurement of combustible gases
Performance requirements for Group II apparatus
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Appareils électriques de détection et de
mesure des gaz combustibles

Règles de performances 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
Explosionsgrenze

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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

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.

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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

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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 $\pm 5\%$ of the measuring range or $\pm 10\%$ 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 $\pm 7\%$ of the measuring range or $\pm 15\%$ 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 $\pm 3\%$ of the measuring range or $\pm 10\%$ of the indication, whichever is the greater.
- b) Long term drift. The long term variation shall not exceed $\pm 10\%$ of the measuring range or $\pm 30\%$ of the indication, whichever is the greater.

5.5 Drift (spot reading apparatus)

The variation shall not exceed $\pm 3\%$ of the measuring range or $\pm 10\%$ 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 $20\text{ }^{\circ}\text{C}$, 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 $-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$ shall not exceed $\pm 3\%$ of the measuring range or $\pm 10\%$ 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 $-25\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$. The variation shall not exceed $\pm 7\%$ of the measuring range or $\pm 15\%$ of the indication, whichever is the greater.
 - 2) Control units. With the sensor under normal ambient test conditions, the variation over the temperature range $+5\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$ shall not exceed $\pm 3\%$ of the measuring range or $\pm 10\%$ of the indication, whichever is the greater.

5.8 Pressure

The variation of the indication from that at $101,3\text{ kPa}$, over a pressure range of 95 kPa to 110 kPa , shall not exceed $\pm 5\%$ of the measuring range or $\pm 15\%$ 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 $+40\text{ }^{\circ}\text{C}$, shall not exceed $\pm 5\%$ of the measuring range or $\pm 15\%$ of the indication, whichever is the greater.

5.10 Air speed

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

5.11 Pumping rate

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

5.12 Orientation

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

5.19 Battery capacity

5.19.1 Portable continuous duty apparatus

The variation shall not exceed $\pm 3\%$ of the measuring range or $\pm 10\%$ 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 $\pm 6\%$ of the measuring range or $\pm 20\%$ of the indication, whichever is the greater.

5.19.2 Portable spot-reading apparatus

The variation shall not exceed $\pm 3\%$ of the measuring range or $\pm 10\%$ 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 $\pm 6\%$ of the measuring range or $\pm 20\%$ 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 $\pm 3\%$ of the measuring range or $\pm 10\%$ of the indication, whichever is the greater.

5.20.2 External d.c. powered apparatus

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

5.20.3 Apparatus with other power supplies

The variation of the indication shall not exceed $\pm 3\%$ of the measuring range or $\pm 10\%$ 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 $\pm 2\%$ of the measuring range or $\pm 5\%$ 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 $\pm 3\%$ of the measuring range) or $\pm 10\%$ of the indication, whichever is the greater. The apparatus shall suffer no loss of function nor spurious alarm.