BS EN 50194-1:2009

BSI British Standards

Electrical apparatus for the detection of combustible gases in domestic premises —

Part 1: Test methods and performance requirements

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BSI British Standards

National foreword

This British Standard is the UK implementation of EN 50194-1:2009. It supersedes BS EN 50194:2000 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/31, Equipment for explosive atmospheres, to Subcommittee GEL/31/19, Gas detectors.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EN 50194-1

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English version

Electrical apparatus for the detection of combustible gases in domestic premises - Part 1: Test methods and performance requirements

Matériels électriques
pour la détection des gaz combustibles
dans les locaux à usage domestique -
Partie 1: Méthodes d'essai
et exigences d'aptitude à la fonction

Elektrische Geräte
für die Detektion von brennbaren Gasen
in Wohnhäusern -
Teil 1: Prüfverfahren und Anforderungen
an das Betriebsverhalten

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 216, Gas detectors.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50194-1 on 2008-09-01.

This European Standard supersedes EN 50194:2000.

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)	2009-09-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-09-01

Contents

1 Scope

This European Standard specifies general requirements for the construction, testing and performance of electrically operated apparatus for the detection of combustible gases, designed for continuous operation in a fixed installation in domestic premises. The apparatus may be mains or battery powered.

Additional requirements for apparatus to be used in recreational vehicles and similar premises are specified in EN 50194-2.

NOTE 1 For caravan holiday homes EN 50194-1 applies.

This European Standard specifies two types of apparatus to operate in the event of an escape of town gas, natural gas or liquefied petroleum gas (LPG):

- Type A apparatus - to provide a visual and audible alarm and an executive action in the form of an output signal that may actuate directly or indirectly a shut-off device and/or other ancillary device;
- Type B apparatus - to provide a visual and audible alarm only.

This European Standard excludes apparatus for the detection of toxic hazards of gases such as carbon monoxide (see EN 50291-1 and EN 50291-2).

Apparatus complying with this standard is not considered suitable for industrial or commercial installations for which EN 60079-29-1 apply.

NOTE 2 Apparatus tested in accordance with EN 60079-29-1 will not necessarily comply with this European Standard.

2 Normative references

The following referenced documents are indispensable for the application 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 437	1993	Appliances using combustible gases - Test gases, test pressure and categories of appliances
EN 1775	2007	Gas supply - Gas pipework for buildings - Maximum operating pressure less than or equal to 5 bar - Functional recommendations
EN 50244	2000	Electrical apparatus for the detection of combustible gases in domestic premises - Guide on the selection, installation, use and maintenance
EN 50270	2006	Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen
EN 50291	2001	Electrical apparatus for the detection of carbon monoxide in domestic premises - Test methods and performance requirements
EN 60079-29-1	2007	Explosive atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases (IEC 60079-29-1:2007, modified)
EN 60335-1	2002	Household and similar electrical appliances - Safety - Part 1: General requirements (IEC 60335-1:2001, modified)
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)
EN 60704-1	1997	Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 1: General requirements (IEC 60704-1:1997)

3 Definitions

For the purposes of this European Standard the following definitions apply:

3.1
ambient air
the normal atmosphere surrounding the apparatus

3.2
clean air
air which is free from combustible gases, interfering and contaminating substances

3.3
domestic premises
any house or building being the place of residence or home of a household, family or person

3.4
fixed installation
an apparatus which is intended to have all parts except replaceable batteries permanently installed

3.5
latching alarm
an alarm which, once activated, requires deliberate action for resetting

3.6
lower explosive limit (LEL)
the volume ratio of flammable gas or vapour in air below which an explosive gas atmosphere will not be formed

NOTE Annex A of EN 61779-1:2000 gives a list of flammability levels which are the internationally agreed basis for the type testing of devices. National regulations may use differing values for the LEL of some substances (for example the values for methane and propane, which were specified in older European Standards).

3.7
sensor
an assembly in which the sensing element is housed and which may contain associated circuit components

3.8
sensing element
a device, the output of which will change in the presence of combustible gas

3.9
volume ratio (v/v)
ratio of the volume of a component to the volume of the gas mixture

3.10
output signal
signal characterized by a standby state and an activated state by which action may be initiated (for example, triggering of a shut-off device)

3.11
alarm set point
a fixed setting of the apparatus that determines the volume ratio of combustible gas at which the apparatus will automatically initiate an alarm and for Type A apparatus, an output signal

3.12
gas detection apparatus
apparatus comprising the sensor, remote sensor if applicable, alarm and other circuit components, power supply and for Type A apparatus a means of providing an output signal

3.13
fault signal
a visual or audible signal indicating a faulty or failed apparatus

3.14
LPG
butane, propane or mixtures thereof

3.15
mains powered apparatus
an apparatus designed to be powered by the domestic mains electrical supply, with or without additional power source

3.16
self contained battery powered apparatus
apparatus provided with an internal battery to provide the necessary amount of energy for a predefined duration of operation

3.17
warm-up time
the time interval between the time when the apparatus is switched on and the time when the apparatus is fully operational

3.18
continuous operation
apparatus which is continuously powered with continuous or intermittent automatic sensing

3.19
recreational vehicle
recreational vehicles considered by this standard include recreational craft, caravans and motor caravans

NOTE Other motorised vehicles like trucks are known to have residential accommodation. They are not recreational vehicles but are considered as similar premises in respect of this standard.

3.20
caravan holiday home
transportable leisure accommodation vehicle that does not meet requirements for construction and use of road vehicles, that retains means for mobility and that is for temporary or seasonal occupation [from EN 13878]

4 General requirements

4.1 General

Unless otherwise stated, the requirements specified are applicable to both Type A and Type B apparatus.

The apparatus shall reliably detect the presence of combustible gas in domestic premises under the stated application conditions, shall produce an alarm, and in the case of Type A apparatus, shall be able to initiate executive actions whenever the level exceeds a preset alarm volume ratio.

The apparatus, electrical assemblies and components shall comply with the construction requirements of 4.2 to 4.6 and the test and performance requirements of Clause 5. Apparatus shall be designed for fixed installation and continuous operation. The apparatus shall not be class 0 as defined in EN 60335-1:2002, 3.3.7.

When replaceable, the sensor as defined under 3.7 shall guarantee the same constructional characteristics and functions as the previous sensor without modifying the internal detector in such a way as to keep unchanged the compliance of the detector to all the requirements of this standard. The above condition shall be verified using the information and the documentation given by the manufacturer of the detector.

All text on the apparatus, its packaging and in the instruction booklet shall be in accordance with National regulations.

4.2 Construction

The apparatus shall comply with the appropriate requirements of EN 60335-1:2002 as listed in Table 1.

Table 1 - Construction requirements

Constructional requirement	EN 60335-1:2002 Clause
Protection against access bility to live parts	8
Heating	Relevant parts of 11
Leakage current and electrical strength at operating temperature	13
Moisture resistance	15.1 and 15.3
Leakage current and electrical strength	16
Overload protection of transformers and associated circuits	17
Abnormal operation	19
Construction	22
Internal wiring	23
Components	24.1, 24.2 and 24.4
Supply connection and external flexible cords	25.3
Terminals for external conductors	26
Provision for earthing	27
Screws and connections	28
Creepage distances, clearances and distances through insulation	29
Resistance to heat and fire	30
Resistance to rusting	31

In addition, when the sensor is replaceable:

Mechanical and/or electrical means shall guarantee the replacement of the sensor without errors. In the case of electrical recognition of the incorrect connection or the absence of the sensor, the detector shall automatically signal a fault and/or alarm. Moreover it shall be impossible, or recognised as an error, to connect a sensor designed for a certain type of gas to a detector designed for a different type of gas.

4.3 Indicators and alarms

4.3.1 Visual indicators shall be fitted and coloured as follows:

a) power supply indicators shall be coloured green;

b) alarm indicators shall be coloured red;

c) where fitted, the visual fault indication shall be yellow.

If a sensor “end-of-life” visual indication is fitted, this shall be clearly different from all other visual indications.

The visual indicators shall be labelled to show their function.

The visual indicators shall be visible when the apparatus is installed in its operating position according to the manufacturers instructions.

4.3.2 The apparatus shall have an audible alarm, see 5.3.16.

4.3.3 Visual indicators and audible alarms, shall operate at a volume ratio above 3 % LEL and below 20 % LEL of the gas to be monitored. The alarms shall remain in operation at gas volume ratios above that alarm set point.

NOTE A latching alarm may be used to accomplish the requirements of this clause.

The manufacturer shall declare the alarm set point of the apparatus. When measured as specified in 5.3.4.2, the alarm shall operate within ± 2,5 % LEL of the declared value. For all tests thereafter, the alarm set point shall be within ± 5 % LEL of the declared value but within the overall band of above 3 % LEL and not exceeding 20 % LEL.

4.3.4 No adjustment shall be possible from outside of the apparatus without breaking or removing seals placed there to prevent access.

4.4 Fault signals

The apparatus shall provide a fault signal in the event of loss of continuity or short circuit to the sensor.

The fault signal shall be clearly identified and different from a gas alarm.

4.5 Output signal (applicable for Type A apparatus only)

The output signal of the apparatus shall operate at the same conditions as the visual and audible alarm. For triggering an output signal, a built-in delay shall not exceed 2 min.

4.6 Labelling and instructions

4.6.1 Labelling

The apparatus shall carry durable label(s) carrying the following information:

a) The manufacturer's or supplier's name, trademark or other means of identification.

b) The name of the apparatus and the type of gas to be detected, for example, ‘methane gas detector’ and the model number.

c) The number of this European Standard.

d) The type of apparatus, A or B.

e) The serial number or manufacturing date code of the apparatus.

f) For mains powered apparatus, the electricity supply voltage, frequency and maximum power consumption.

g) For battery powered apparatus, the type and size of replacement batteries.

h) Recommendations on the replacement procedures and lifetime of the apparatus.

i) The expected lifetime of the sensor, if different from the lifetime of the apparatus.

j) When the apparatus has a replaceable sensor the apparatus shall be de-energised before the sensor is replaced.

k) When the sensor is replaceable, the apparatus shall carry the next replacement date of the sensor. This information shall be provided in such a way that the revision of this date is possible at every replacement of the sensor.

NOTE If the updating procedure requires the application of a pre-printed label, this shall be supplied with the new sensor with a warning to replace the previous label attached to the sensor by the new one. Every sensor shall be provided with a

marking that allows the manufacture and calibration of each sensor to be traced (e.g. serial number, manufacturing batch/production date, expected lifetime of the apparatus, etc.).

The markings b), h), i), j) and k) shall be clearly visible with the apparatus in a typical installed position.

The markings shall be legible and shall comply with 7.6 and 7.14 of EN 60335-1:2002.

4.6.2 Cautions

All gas detection apparatus shall carry a caution, on a label attached to the apparatus, for example:

CAUTION: READ THESE INSTRUCTIONS CAREFULLY
BEFORE OPERATING OR SERVICING.

4.6.3 Instruction booklet

The apparatus shall be provided with an instruction booklet or leaflet. The instruction book or leaflet shall give complete, clear and accurate instructions for the installation, safe and proper operation, and regular checking of the apparatus. It shall include at least the following information:

a) For mains powered apparatus, the correct operating voltage, frequency, fuse-rating, if any, and method of connection to premises supply system.

b) For battery powered apparatus, the type and size of replacement batteries, normal operating life, battery replacement instructions and information on low battery conditions.

c) Guidance on siting and mounting of the apparatus and the warning that the apparatus should be installed by a competent person, (see Annex A and EN 50244).

d) Actions to be taken if the apparatus alarms (see Annex B and EN 50244).

e) An explanation of all warning (visual and audible) and other indications, including re-setting facilities where relevant.

f) A list of commonly occurring materials, vapours or gases, for example in cleaning fluids, polishes, paints, cooking operations, etc. which may affect the reliability of the apparatus in the short or long term.

g) Warning of the possible hazards of electric shock or malfunction if the apparatus is tampered with.

h) Instruction on the use of any test method supplied with the apparatus and a warning on false conclusions that may be drawn from the application of other methods, such as gas lighters, flammable vapours, etc.

i) Requirements that the gas installation and shut-off device, if any, shall comply with the national regulations in force in the country where it is being installed, see EN 1775.

j) The expected lifetime of the apparatus.

k) For Type A apparatus, instructions on the use and characteristics of the output signal.

l) Methods and products that may be used for cleaning the apparatus.

m) The possibility of smelling gas prior to the apparatus giving an alarm.

n) A note stating the working temperature and humidity ranges.

o) The gas volume ratio at which the alarm shall operate. This factory set value shall be between 3 % LEL and 20 % LEL.

When the sensor is replaceable, the instruction booklet shall contain the following additional information:

p) Warning of the need of correct replacement of the sensor to return the apparatus to its original operating condition.

q) Full sensor replacement procedure including any necessary precautions and/or warnings.

r) The expected lifetime of the sensor (e.g. maximum operating life of the sensor: e.g. 4 years).

s) Maximum number of possible replacements. (e.g. maximum number of replacements of the sensor after the first installation: e.g. 2).

t) The date of replacement of the complete apparatus since first installation (e.g. replacement date of the complete apparatus: month/year).

u) Instructions for the disposal of the apparatus at the end of its working life.

4.6.4 Packaging

The apparatus packaging shall

- carry a warning that the apparatus should be installed by a competent person;
- carry relevant information regarding storage and transport.

5 Test and performance requirements

5.1 General requirements for tests

5.1.1 Samples and sequence of tests

For the purposes of type testing:

- compliance with 4.2 and 5.3.16 to 5.3.18 shall be verified using samples as required. These samples should not be used for subsequent tests;
- three samples shall be subjected to the tests specified in 5.3.2 to 5.3.13 and for battery powered apparatus, Clause 6. All three samples are required to pass the tests;
- three further samples may be used for the ignition test 5.3.15. All three samples are required to pass the test;
- three further samples may be used for the long term stability test 5.3.14. All three samples are required to pass the test.

5.1.2 Preparation of samples

The sample apparatus shall be prepared and mounted when applicable, in accordance with the manufacturer's instructions without modification.

The entire apparatus shall be subjected to the test conditions.

5.1.3 Use of mask for testing

The use of a mask is allowed for subjecting the apparatus to test gases. The design and operation of the mask used by the testing laboratory, in particular the gas pressure and velocity inside the mask, shall not influence the response of the apparatus or the results obtained. The manufacturer may provide a suitable mask with the apparatus.

5.1.4 Test chamber

The construction of the chamber shall be such as to ensure that the apparatus is exposed to a specific volume ratio of test gas in a reproducible manner.

5.2 Normal conditions for tests

5.2.1 General

The test conditions specified in 5.2.2 to 5.2.9 shall be used for all tests unless otherwise specified. Before commencing any test sequence, the apparatus shall be allowed to warm-up for a minimum period of 1 h except for 5.3.5.

5.2.2 Test gases for alarm testing

The gas used for preparing air-gas mixtures for all tests, except the test in 5.3.15, shall be:

- town gas mixture of composition G110 for apparatus intended for sensing town gas;
- methane of composition G20 for apparatus intended for sensing natural gas;
- butane of composition G30 for apparatus intended for sensing LPG.

These gas compositions shall be as defined in EN 437:1993.

5.2.3 Test gas volume ratios

For the tests in 5.3.4.1 and 5.3.12.1, the test gas volume ratio shall be (3 ± 0,3) % LEL above and below the volume ratios declared by the manufacturer. The test gas volume ratios shall not exceed the overall band of (3 to 20) % LEL.

The test gas shall be applied for at least 5 min or until the mask or chamber is fully purged.

For all other tests, unless otherwise specified, the test gas volume ratio shall be (6 ± 0,6) % LEL above and below the volume ratio declared by the manufacturer. The test gas volume ratio shall not exceed the overall band of (3 to 20) % LEL.

The test gas shall be applied for at least 5 min or until the mask or chamber is fully purged.

5.2.4 Speed of test gases

The speed of air or test gas in the test chamber shall be between 0,1 m/s and 0,5 m/s. In the case of a mask, the requirements of 5.1.3 apply.

5.2.5 Power supply

For mains powered apparatus, the electricity supply shall be within ± 2 % of the nominal value declared by the manufacturer.

5.2.6 Temperature

The tests shall be performed using air and test gases of constant temperature ± 2 °C within the range 15 °C to 25 °C throughout the duration of each test.

5.2.7 Humidity

The tests shall be performed using air and test gases of constant relative humidity (r.h.) ± 10 % r.h. within the range 30 % r.h. to 70 % r.h. throughout the duration of each test.

5.2.8 Pressure

The tests shall be performed using air and test gases of constant pressure ± 1 kPa within the range of 86 kPa to 108 kPa throughout the duration of the test.

5.2.9 Removable parts

Optional filters, windshields, or diffusion devices supplied or recommended by the manufacturer shall be attached or removed according to which condition gives the most unfavourable result for the test being conducted.

5.3 Test methods and performance requirements

5.3.1 General

The apparatus shall comply with all the requirements under the specified test conditions. Unless otherwise stated, each test condition shall be separately varied while the others remain normal as defined in 5.2.

When the apparatus is switched on, a warm-up time during which the apparatus is not in an active monitoring mode is acceptable.

The following sequence of tests shall be adhered to and, unless otherwise stated, they shall be carried out in clean air or the test air gas mixture, as appropriate.

5.3.2 Unpowered storage

Expose the apparatus sequentially to the following conditions:

a) a temperature of (-20 ± 2) °C for 24 h;

b) ambient temperature for 24 h;

c) a temperature of (50 ± 2) °C for 24 h;

d) ambient temperature for 24 h.

Allow the apparatus to warm up for 1 h and then subject it to the tests given in 5.3.4 to 5.3.13.

5.3.3 Output signal

5.3.3.1 Test

For Type A apparatus, verify the output signal is activated according to the manufacturer's specification under test conditions.

5.3.3.2 Performance requirement

The apparatus shall provide the output signal in accordance with the manufacturer's specification and any in-built delay shall not exceed 2 min.

5.3.4 Alarm set point

5.3.4.1 Pre-set level

The manufacturer shall pre-set the alarm set point within the limits described in 4.3.3.

5.3.4.2 Test

Allow the apparatus to warm up for 1 h in clean air. Then subject the apparatus to the test gases as specified in 5.2.3.

Under the environmental conditions specified in 5.2.5 to 5.2.8, three consecutive tests shall be carried out at 5 min intervals.

5.3.4.3 Performance requirements

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test.

5.3.5 Alarm test during warm-up time

5.3.5.1 Test

Mount the apparatus in clean air for 24 h in an unenergized condition. Introduce the test gas mixture at a volume ratio of 25 % LEL and immediately switch on.

5.3.5.2 Performance requirement

The apparatus shall alarm within 5 min of being switched on.

5.3.6 Response time

5.3.6.1 Test

Expose the apparatus to a step change in the gas volume ratio from clean air to 25 % LEL within a time limit of not more than 5 s.

5.3.6.2 Performance requirement

The visual and audible alarms shall operate within 30 s of exposure to the step change in gas volume ratio.

NOTE For Type A apparatus, it is permissible to have a delay of up to a maximum of 2 min on the triggering of the output signal.

5.3.7 Temperature effects

5.3.7.1 Test

Expose the apparatus and the test gas to a temperature of (-10 ± 1) °C for at least 6 h, followed by ambient temperature for at least 6 h and finally to a temperature of (40 ± 1) °C for at least 6 h. At the end and in the same condition of each exposure, subject the apparatus to the test gas as specified in 5.2.3.

5.3.7.2 Performance requirement

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test.

5.3.8 Humidity effects

5.3.8.1 Test

Expose the apparatus and the test gas to a humidity of (30 ± 5) % r.h. at (15 ± 2) °C for a period of 1 h followed by an exposure to (90 ± 5) % r.h. at (40 ± 2) °C for a period of 1 h. At the end and in the same condition of each exposure, subject the apparatus to the test gas as specified in 5.2.3.

5.3.8.2 Performance requirement

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test.

5.3.9 Speed of test gas

5.3.9.1 Test

Expose the apparatus to the test gas at an air speed of (1,2 ± 0,1) m/s in a flow chamber with the apparatus in the normally mounted position. Subject the apparatus to the test gas as specified in 5.2.3.

5.3.9.2 Performance requirement

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test.

5.3.10 Supply voltage variations (mains powered apparatus only)

5.3.10.1 Test

Set up the apparatus under normal conditions (5.2) at the rated supply voltage U_n and frequency. Subject the apparatus to test gas as specified in 5.2.3 at a rated supply voltage of U_n + 10 % U_n. Repeat the test at a supply voltage of U_n – 10 % U_n.

5.3.10.2 Performance requirement

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test.

5.3.11 Electromagnetic compatibility

5.3.11.1 Test

Test the apparatus, including the sensor and interconnecting wiring, for electromagnetic compatibility in accordance with EN 50270.

5.3.11.2 Performance requirements

The apparatus shall suffer no loss of function nor give any alarm when tested in accordance with EN 50270.

5.3.12 Slow increase of gas volume ratio

5.3.12.1 Test

Allow the apparatus to warm up for 1 h in clean air. Then subject the apparatus to test gas at a volume ratio of 0,1 % LEL for 15 min. Increase the volume ratio of test gas every 15 min in steps of 0,1 % LEL up to the final volume of 6 % LEL. The apparatus shall be exposed to this final volume ratio for 1 h. The apparatus shall then be subjected to clean air for 15 min. Subject the apparatus to the test gas as specified in 5.2.3.

5.3.12.2 Performance requirements

The lower volume ratio of the test gas shall cause no alarm. The higher volume ratio of the test gas shall induce an alarm.

5.3.13 Effects of other gases

5.3.13.1 Test

Subject the apparatus consecutively to the following gas mixtures under the conditions given below:

– NO at a mass fraction of $5 \times 10^{-6}\ ^{+2}_{0} \times 10^{-6}$ for 1 h;

– SO_2 at a mass fraction of $2 \times 10^{-6}\ ^{+1}_{0} \times 10^{-6}$ for 1 h;

- ethanol at a mass fraction of 500 x 10^{-6} ± 50 x 10^{-6} for 30 min for LPG apparatus;
- ethanol at a mass fraction of 2000 x 10^{-6} ± 200 x 10^{-6} for 30 min for apparatus suitable for town gas or natural gas;
- hexamethyldisiloxane at a mass fraction of 10 x 10^{-6} ± 3 x 10^{-6} for 40 min.

The NO, SO_2 and hexamethyldisiloxane tests may be carried out with dry gas. After any test in dry gas, allow 1 h for the apparatus to reach equilibrium under normal conditions. After exposure to each of these gases, subject the apparatus under normal conditions to the test gases as specified in 5.2.3.

5.3.13.2 Performance requirement

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test.

5.3.14 Long term stability

5.3.14.1 Test

Mount the apparatus, expose it to clean air and energize continuously for a period of 3 months. Every 15 days expose the apparatus to the test gases as specified in 5.2.3. During the test, the ambient conditions shall remain within the overall bands specified in 5.2.6, 5.2.7 and 5.2.8 disregarding tolerances.

5.3.14.2 Performance requirement

The lower volume ratio of test gas shall cause no alarm, the higher volume ratio of test gas shall induce an alarm. No other alarm shall be generated.

5.3.15 Ignition test

Place the whole apparatus in a test chamber and allow it to warm up for a period of 1 h in clean air. Connect Type A apparatus to appropriate electrical loads. Increase the volume ratio of an appropriate test gas mixture gradually to:

- 8,5 % V/V ± 0,2 % V/V methane for apparatus intended for use with natural or town gas;
- 4,6 % V/V ± 0,2 % V/V butane for apparatus intended for use with LPG.

The volume ratio of LEL shall be achieved in not less than 5 min.

For compliance, no explosion or ignition shall occur within 5 min of reaching the final explosion test gas volume ratio.

NOTE 1 The test chamber shall be suitable for the ignition test descr bed in 5.3.15 and all national regulations for the safety of personnel carrying out this test shall be complied with.

NOTE 2 For carrying out the ignition test, experienced personnel are required. In cases of uncertainty, this test should be carried out by an experienced test-house.

5.3.16 Alarm sound level

5.3.16.1 Test

The test shall be carried out in free-field conditions over reflecting planes, the horizontal plane simulating the floor or the ceiling and the vertical plane simulating the wall.

Following the manufacturers instructions, locate the apparatus on the vertical plane, 0,3 m from the horizontal plane. To simulate a position near the ceiling, apparatus designed for the detection of natural gas or town gas shall be installed upside down on the vertical plane.

Position the microphone so that its axis corresponds to the geometric centre of the apparatus, see Figure 1.

Test in accordance with EN 60704-1:1997.

NOTE For apparatus which emit an intermittent or modulated sound it may be necessary to modify the circuit in order to obtain a continuous signal.

5.3.16.2 Performance requirement

The sound level shall be at least 85 dB at 1 m.

5.3.17 Degree of protection

5.3.17.1 Test

The enclosure of the apparatus shall provide a degree of protection of at least IPX2D.

The apparatus shall be tested in accordance with EN 60529:1991, Clauses 12, 13 and 14.

5.3.17.2 Performance requirement

The apparatus shall meet the requirements specified in Clauses 12, 13 and 14 of EN 60529:1991.

5.3.18 Mechanical strength

5.3.18.1 Test

The apparatus shall be tested in accordance with the test specified in Clause 21 of EN 60335-1:2002 with the following modification to the third paragraph:

The apparatus is rigidly supported and three blows are applied to every point of the enclosure that is likely to be weak with an impact energy of (1 ± 0,2) J.

5.3.18.2 Performance requirement

The apparatus shall meet the requirements specified in Clause 21 of EN 60335-1: 2002.

6 Self-contained battery powered apparatus

6.1 Battery fault warning

6.1.1 General

Self contained apparatus incorporating a battery shall give a visual or audible fault warning as specified in 6.2.3 before a decrease in the terminal voltage of the battery prevents correct operation.

6.1.2 Test

Connect the apparatus to a stabilized power supply set to the rated battery voltage. Decrease the supply voltage in steps of 0,1 V at intervals of at least 1 min, until the fault warning is given. Record the supply voltage at which the warning is given as U_{E}. At the voltage one step above the voltage at which the fault warning is given, subject the apparatus to the test gases as specified in 5.2.3.

6.1.3 Performance requirements

The lower volume ratio of test gas shall cause no alarm. The higher volume ratio of test gas shall induce an alarm. No other alarms shall be generated during the test. For Type A apparatus, the output signal shall be activated.

6.2 Battery capacity

6.2.1 General

Batteries of self-contained apparatus shall be capable of supplying the quiescent load of the apparatus together with the additional load of routine testing, for a period as specified in 6.2.3 before the battery fault warning is given and, thereafter, of generating an alarm or, in the absence of an alarm, of operating for a further period as prescribed in 6.2.3.

6.2.2 Assessment

In the case of third party testing, the manufacturer shall supply details of the capacity of the recommended battery or batteries together with characteristic curves for voltage variation with time at (20 ± 10) °C for appropriate values of current drainage.

The current drawn by the apparatus in the quiescent and routine testing conditions shall be measured.

6.2.3 Performance requirements

The assessment of 6.2.2 shall indicate that the battery or batteries are capable of operating the apparatus as indicated in 6.2.1 for a period of 6 months. From the time when low battery voltage warning is indicated, the battery shall have sufficient capacity to give an alarm signal as specified in 4.3.3 for at least 4 min in the event of a gas leak, or, in the absence of a gas leak, a low battery voltage warning for at least 7 days.

The low battery voltage warning shall be indicated by either:

- a suitable permanent optical indication for example a separate LED or a flashing of the fault indicator; or
- an acoustic indicator which may be intermittent having a minimum of 1 min energized per hour.

In the case of an alarm due to gas, the alarm sound shall be as specified in 4.3.2.

6.3 Battery reversal

6.3.1 General

The battery reversal test shall be applied to apparatus incorporating replaceable batteries if there is any possibility of the apparatus being subjected to reversed polarity of the supply during normal battery replacement.

6.3.2 Test

a) With a new battery fitted, subject the apparatus to the test gas specified in 5.2.3.

b) Remove the battery and replace it in the apparatus with reverse polarity for 10 s to 15 s.

c) Remove the battery and replace it in the apparatus with the correct polarity, subject the apparatus to the test gas specified in 5.2.3.

d) Remove the battery and apply a voltage to the apparatus of between U_E and 0,95 U_E as determined in 6.1.2.

6.3.3 Performance requirements

The lower volume ratio of test gas shall cause no alarm. The higher volume ratio of test gas shall induce an alarm. No other alarm shall be generated.

During stage b) the power supply indicator shall not be activated.

During stage d) the low battery voltage warning shall be given.

For Type A apparatus, the output signal shall be activated.

6.4 Battery connections

6.4.1 General

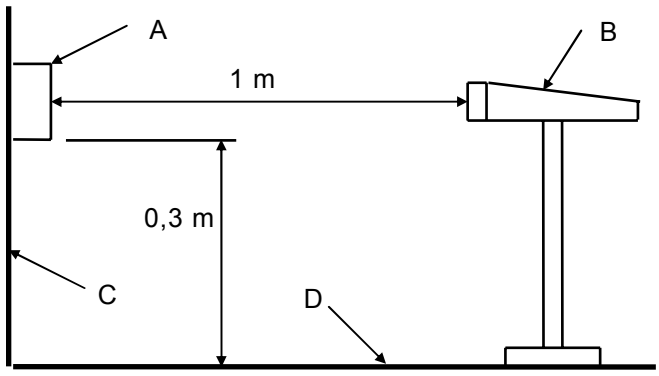
Where batteries are connected to a circuit board within the apparatus by flexible leads, strain relieving devices shall be fitted adjacent to both battery terminal connectors and the circuit board so that any pull on the leads shall not be transmitted to the battery terminals or circuit board.

6.4.2 Test

Leads shall be subjected to a pull of (20 ± 2) N without jerks for 1 min in any direction allowed by the design.

6.4.3 Performance requirements

The strain relieving devices shall be effective in ensuring that strain is not imparted to the battery terminals or circuit board during the test. This shall be checked by visual inspection.



Key

A is the apparatus

B is the microphone

C is the wall (vertical plane)

D is the floor or ceiling (horizontal plane)

Figure 1 - Sound level test

Annex A
(informative)

Location of the gas detection apparatus - Guide for writing the instruction booklet

The instructions for siting the apparatus should be clear and simple, and the terms should be acceptable in common usage.

Wherever necessary diagrams and/or photographs may augment the text.

The instruction should include information on:

a) the recommended position for siting the apparatus, for example:
   - for natural gas or town gas, the maximum distance from the ceiling and from any gas appliance,
   - for LPG, the maximum distance from floor level and from any gas appliance;

b) additional considerations, for example:
   - for natural gas or town gas, above the highest window or door opening,
   - for LPG, not adjacent to exits;

c) guidance on where the unit should not be sited, for example:
   - directly above cooking appliances,
   - directly above a sink,
   - adjacent to extractor fans,
   - in any outside location,
   - where the environmental conditions are outside the manufacturers operational specification.

Annex B
(informative)

Emergency actions - Guide for writing the instruction booklet

It is recommended that the following advice should be given in the event of an alarm sounding or the smell of gas even without an alarm:

Keep calm, and carry out the following actions, not necessarily in the order given:

- extinguish all naked flames, including all smoking material;
- turn off all gas appliances;
- do not switch on or off any electrical equipment, including the gas detection apparatus;
- turn off the gas supply at the gas main control and/or (with a LPG supply) the storage tank;
- open doors and windows to increase ventilation;
- do not use a telephone in the building where the presence of gas is suspected.

If the alarm continues to operate, even after an alarm resetting action where appropriate, and the cause of the leak is not apparent and/or cannot be corrected, vacate the premises and IMMEDIATELY NOTIFY the gas supplier and/or the gas emergency 24 h-service in order that the installation may be tested and made safe, and any necessary repair carried out.

If the alarm stops or a latching alarm is reset according to the instructions of the manufacturer and the reason for the alarm having operated is identified, (for example a gas tap switched on with the burner unlit), after stopping the gas release and ensuring that all appliances are turned off, the main gas supply may be reinstated.

For Type A apparatus, a delay of up to two minutes may occur between the audible alarm and the triggering output signal. However, even if the apparatus is fitted with a triggering device, for example for closing a solenoid valve on the incoming gas pipe, the same procedure as described above should be followed.

Annex C
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard falls under Directive 2006/95/EC.

NOTE (from CEN/CENELEC IR Part 2:2006, 2.17) Where standards fall under EC Directives, it is the view of the Commission of the European Communities (OJ No C 59; 1982-03-09) that the effect of the decision of the Court of Justice in case 815/79 Cremonini/Vrankovich (European Court Reports 1980, p. 3583) is that compliance with A-deviations is no longer mandatory and that the free movement of products complying with such a standard should not be restricted except under the safeguard procedure provided for in the relevant Directive.

A-deviations in an EFTA-country are valid instead of the relevant provisions of the European Standard in that country until they have been removed.

Clause	Deviation
General	**Italy** (Italian Law 6/12/1971 n. 1083 and Ministerial Decree 26/04/1995) Clause 4, "Concetti di afficabilità" of the Italian standard UNI-CEI 70028:1994 "Rivelatori di gas naturale e rivelatori di GPL per uso domestico e similare" is maintained along with all the requirements of the present EN 50194.

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