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Električne naprave za zaznavanje vnetljivih plinov, ki se uporabljajo v gospodinjstvu - 1. del: Preskusne metode in zahtevane lastnosti

Electrical apparatus for the detection of flammable gases in household applications - Part 1: Test methods and performance requirements

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

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Electrical apparatus for the detection of flammable gases in household applications - Part 1: Test methods and performance requirements

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

To be completed

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2023-02-10.

It has been drawn up by CLC/TC 216.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 50194-1:2022) has been prepared by Technical Committee CLC/TC 216 “Gas detectors”, the secretariat of which is held by BSI.

The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50194-1:2009 and all of its amendments and corrigenda (if any).

prEN 50194-1:2022 includes the following significant technical changes with respect to EN 50194 –1:2009:

Description	Clause
This document has been completely revised following the structure of EN 50291-1:2018	All
End of Life indicator has been made mandatory and shall include an audible and visible warning	5.5
Guidance has been added for assessing battery capacity and expected life	8.2
Requirements for mains powered alarms with back-up supply have been added	8.5
The number of potential interference gases has been increased	
Tests have been added for an optional alarm silence facility	
Requirements have been added for apparatus using radio links	7
Added requirements for the use of batteries	5.10
Annex B has been added	Annex B
New requirement to comply with EN 50271 Standard for software	5.8
Defined type C apparatus for refrigerant gases	1
Bibliography has been added	
Annex C “A-deviations” has been removed	
Tests for stability in high humidity (non-condensing) and low humidity for Type C apparatus has been added	6.3.19 and 6.3.20
Ignition test for Hydrogen and Type C apparatus has been added	6.3.14
Tests for refrigerant poisoning and oil spray for Type C apparatus has been added	6.3.15
Revision of the Normative references	2

Introduction

This document defines test methods and performance requirements for all electrical gas detection equipment used in residential and household applications by means of measurement of one or more threshold alarm levels. It is addressed to the manufacturers of such equipment and test laboratories which validate it.

This document is an updated revision of the previous EN 50194-1 issued in 2009 and includes some new concepts of detection:

The term of “domestic” has been implemented in “household premises” in order to include further applications, i.e. shops, offices, hotel rooms, residential premises and in general where household appliances are installed (as defined in IEC/EN 60335-1).

This document implements a new range of the flammable gases to be detected. In the premises within the scope of this document, also flammable refrigerant gases, R-717 (Ammonia) at LFL level and Hydrogen in fuel cells applications may be present and are thus necessary to consider.

Finally, the document structure has been completely revised in order to align this revision with the similar standard EN 50291-1:2018 for Carbon Monoxide and other new standards concerning digital and software technologies.

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1 Scope

This document specifies general requirements for the construction, testing and performance of electrically operated apparatus for the detection of flammable gases, designed for continuous operation in a fixed installation in household premises. The apparatus can 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 For caravan holiday homes EN 50194-1 applies.

This document specifies four types of apparatus to operate in the event of an escape of town gas, natural gas or liquefied petroleum gas (LPG), Hydrogen and flammable refrigerant gases:

- Type A apparatus – provides a visual and audible alarm and an executive action in the form of an output signal that can actuate directly or indirectly a shut-off device and/or other ancillary device in the event of an escape of town gas, natural gas (LNG) liquefied petroleum gas (LPG) and Hydrogen gases;
- Type B apparatus – Same as Type A but provides a visual and audible alarm only;
- Type C apparatus – provides a visual and audible alarm and an executive action in the form of an output signal that can actuate directly or indirectly a shut-off device and/or other ancillary device in the event of an escape of flammable refrigerant gas A2L, A2 or A3 as classified in other International Standards, e.g. ISO 817;
- Type D apparatus – intended to be installed where there can be a source of danger to the public, designed for continuous operation in fixed installations in non-classified explosive atmosphere premises (where the requirements for electrical Ex-safety are not requested). Intended for any flammable gases.

Typically Type D apparatus are available with analogue or digital output, in the form of detection system, system regularly maintained by competent persons and/or with protection IP44 or higher.

For type D equipment, EN 60079-29-1 is applied.

See Annex C for further clarification on the apparatus types and their application.

NOTE Apparatus complying with this document is not considered suitable for installation in potentially explosive atmospheres, in which case the EN 60079 series applies.

NOTE Apparatus complying with EN 60079-29-1 will not necessarily comply with this document.

This document does not apply to any of the following:

- apparatus intended for the detection of dusts or mists in air;
- scientific or laboratory-based apparatus used only for analysis or measurement;
- apparatus used exclusively for process measurement purposes;
- apparatus for medical purposes;
- apparatus used for breath alcohol measurement;
- apparatus intended for the direct measurement of automotive exhaust gases;
- apparatus intended for use in industrial environments.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 437:2021, *Test gases. Test pressures. Appliance categories*

EN 1775, *Gas supply - Gas pipework for buildings - Maximum operating pressure less than or equal to 5 bar - Functional recommendations*

EN 50244, *Electrical apparatus for the detection of combustible gases in domestic premises - Guide on the selection, installation, use and maintenance*

EN 50270, *Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen*

EN 50271, *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 60335-1:2002, *Household and similar electrical appliances - Safety - Part 1: General requirements*

EN 60335-1:2012, *Household and similar electrical appliances – Safety - Part 1: General requirements*

IEC 60335-2-40:2022, *Household and similar electrical appliances. Safety - Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60704-1:2010, *Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 1: General requirements (IEC 60704-1:2010)* ²⁰²³

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

ambient conditions

normal atmosphere surrounding the apparatus

3.2

clean air

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

3.3

non-explosive atmosphere premises

apparatus intended for use in residential, commercial and light-industrial environments, as described in EN 61000-6-1 and EN 61000-6-3

3.3.1

household premises

any house or building being a place of residence or home of a household, family or person

3.4**fixed installation**

apparatus which is intended to have all parts except replaceable batteries permanently installed

3.5**latching alarm**

alarm which, once activated, requires deliberate action for resetting

3.6**lower flammable limit****LFL**

volume ratio of flammable gas or vapour in air below which an explosive gas atmosphere will not be formed

Note 1 to entry: Annex B of EN ISO/IEC 80079-20-1:2019 gives a list of flammability levels which are the internationally agreed basis for the type testing of devices. National regulations possibly use differing values for the LFL of some substances (for example the values for methane and propane, which were specified in older European Standards).

3.7**sensor**

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

3.8**sensing element**

part of the sensor which is sensitive to the gas/vapour to be measured, the output of which will change in the presence of flammable gas

3.8.1**integral sensor**

sensor module that is allocated inside a bigger appliance or control system

[SOURCE: IEC 62990-1:2019 – modified] T prEN 50194-1:2023

3.9**volume ratio****V/V**

ratio of the volume of a component to the volume of the gas mixture

3.10**transmittable output signal**

signal characterised by a standby and an activation state by which action may be initiated

EXAMPLE Triggering a ventilation device.

3.11**warm-up time**

time interval between the time when the apparatus is switched on and the time when the apparatus is fully operational

3.12**alarm set point****pre-set alarm level**

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 and Type C apparatus, an output signal

3.13**fault signal**

visual or audible signal indicating a faulty or failed apparatus

prEN 50194-1:2022 (E)**3.14****LPG**

butane, propane or mixtures thereof

3.14.1**flammable refrigerant gas**

refrigerant gas classified as safety group A2L, A2 or A3 according to ISO 817

3.15**mains powered apparatus**

apparatus designed to be powered by the domestic or household 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**continuous operation**

apparatus which is continuously powered with continuous or intermittent automatic sensing

3.18**recreational vehicle**

vehicle such as a recreational craft, caravan and motor caravan

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 document.

3.19**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

[SOURCE: EN 13878:2019]

3.20**gas detection apparatus
detector**

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

3.21**end-of-life**

point in time when the apparatus should be replaced

3.22**sealed-for-life**

self-contained apparatus where the battery, sensor or any other component cannot be tampered with or replaced

3.23**non-replaceable battery-powered apparatus**

apparatus where the battery cannot be tampered with or replaced

3.24

free-field conditions

conditions where there are a minimum number of sound reflecting surfaces or radio frequency reflecting surfaces

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

- U_E supply voltage at which the low battery warning is given
- U_R rated battery voltage
- R_A resistance at which the low battery warning is given with a supply voltage U_R

5 Design requirements

5.1 General requirements

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

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

5.1.3 Apparatus which includes additional functionality outside the scope of this document, shall perform according to the requirements of this document and it is recommended that it also meets the requirements of another applicable European Standard or equivalent relevant to the additional functionality.

5.1.4 The apparatus, electrical assemblies and components shall comply with the construction requirements of 5.2 to 5.6 and the test and performance requirements of Clause 6. 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.

5.1.5 Where the sensor (defined in 3.7) is replaceable, the design of the apparatus shall be such that replacement of the sensor does not affect the compliance of the entire apparatus with the requirements of this document. This condition shall be verified using the information and the documentation provided by the manufacturer of the apparatus.

5.1.6 The apparatus shall indicate end-of-life as per 5.5.4.

5.1.7 The apparatus shall be provided with an installation and maintenance instruction booklet or leaflet meeting the requirements of Clause 9.

5.1.8 The apparatus shall be designed so as to discourage unauthorised interference or adjustment.

5.1.9 Except for batteries and replaceable sensors, the apparatus shall not have any user-replaceable or serviceable components.

5.2 Construction

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 recognized as an error, to connect a sensor designed for a certain type of gas to a detector designed for a different type of gas.