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**Elektromagnetna združljivost - Električne naprave za odkrivanje in merjenje  
vnetljivih in strupenih plinov ali kisika**

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

Elektromagnetische Verträglichkeit – Elektrische Geräte für die Detektion und Messung  
von brennbaren Gasen, toxischen Gasen oder Sauerstoff

Compatibilité électromagnétique – Appareils de détection et de mesure de gaz  
combustible, de gaz toxique et d'oxygène

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**Ta slovenski standard je istoveten z: prEN 50270**

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**ICS:**

13.230	Varstvo pred eksplozijo	Explosion protection
13.320	Alarmni in opozorilni sistemi	Alarm and warning systems
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

**oSIST prEN 50270:2019****en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 50270**

September 2019

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Will supersede EN 50270:2015 and all of its  
amendments and corrigenda (if any)

English Version

**Electromagnetic compatibility - Electrical apparatus for the  
detection and measurement of combustible gases, toxic gases  
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d'oxygène

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toxischen Gasen oder Sauerstoff

This draft European Standard is submitted to CENELEC members for enquiry.  
Deadline for CENELEC: 2019-12-20.

It has been drawn up by CLC/TC 31.

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).

A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

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## European foreword

This document (prEN 50270:2019) has been prepared by CLC/SC 31-9 “Electrical apparatus for the detection and measurement of combustible gases to be used in industrial and commercial potentially explosive atmospheres” of CLC/TC 31, “Electrical apparatus for explosive atmospheres”.<sup>1</sup>

This document is currently submitted to the Enquiry/ Primary Questionnaire.

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 50270:2015 and all of its amendments and corrigenda (if any).

EN 50270:2018 includes no significant technical changes with respect to EN 50270:2015 + AC/2016.

This document has been prepared under the European Commission standardization request M/552 given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2014/30/EU.

For the relationship with EU Directive 2014/30/EU see informative Annex ZZ, which is an integral part of this document.

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<sup>1</sup> CLC/TC 216 “Gas detectors” contributed to the preparation of the text.

## 1 Scope

This document specifies requirements for the electromagnetic compatibility (EMC) for electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen which are subject to the performance standards for gas detection apparatus, for example EN 45544 (all parts), EN 50104, EN 50194 (all parts), EN 50291 (all parts), EN 50379 (all parts), EN 50543, EN 50545-1, EN 60079-29-1 or EN 60079-29-4.

NOTE For the purpose of this standard, the word 'toxic' covers 'very toxic', 'toxic', 'harmful', 'corrosive', 'irritating', 'sensitizing', 'carcinogenic', 'mutagenic' and 'teratogenic'.

This document applies to apparatus intended for use in residential, commercial and light-industrial environments as well as to apparatus intended for use in industrial environments, and includes AC-, DC- or battery powered apparatus.

This document is also applicable to apparatus which is intended for use in hazardous areas which could contain explosive or potentially explosive atmospheres. It covers only normal operation and does not cover safety requirements related to EMC phenomena.

This document is a product standard which is based on the product family standard EN 61326-1. prEN 50270:2019 takes precedence over the product family standard and over generic standards.

This document applies to electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen that include functions specified by the manufacturer as being safety functions and can include functions specified as not being safety functions.

All performance standards for the detection and measurement of combustible gases, toxic gases or oxygen include the minimum requirements for functional safety specified in EN 50271. There are also gas detectors and gas detection systems which are intended to be used with safety integrity levels SIL 1 to SIL 3 according to EN 50402 and EN 61508 (all parts). For functional safety in industrial applications, this document has taken into account those aspects of EN 61326-3-2 relating to the measuring and warning function of the apparatus defined as safety function.

This standard specifies requirements for immunity tests in relation to continuous and transient, conducted and radiated disturbances, including electrostatic discharges, and also for emission tests. The test requirements are specified for each port considered.

Apparatus falling within the scope of this document are classified as follows by the following types.

- Type 1: apparatus intended for use in residential, commercial and light-industrial environments, as described in EN 61000-6-1 and EN 61000-6-3.
- Type 2: apparatus intended for use in industrial environments, as described in EN 61000-6-2 and EN 61000-6-4.

Type 1 apparatus for which the manufacturer claims a safety integrity level should be considered as type 2 apparatus with regard to immunity requirements.

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.

## 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 50291-1:2018, *Gas detectors — Electrical apparatus for the detection of carbon monoxide in domestic premises — Part 1: Test methods and performance requirements*

EN 50291-2:2010, *Electrical apparatus for the detection of carbon monoxide in domestic premises — Part 2: Electrical apparatus for continuous operation in a fixed installation in recreational vehicles and similar premises including recreational craft — Additional test methods and performance requirements*

EN 50545-1:2011,<sup>2</sup> *Electrical apparatus for the detection and measurement of toxic and combustible gases in car parks and tunnels — Part 1: General performance requirements and test methods for the detection and measurement of carbon monoxide and nitrogen oxides*

EN 61000-4-2:2009, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test (IEC 61000-4-2:2008)*

EN 61000-4-3:2006,<sup>3</sup> *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2006)*

EN 61000-4-4:2012, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test (IEC 61000-4-4:2012)*

EN 61000-4-5:2006, *Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test (IEC 61000-4-5:2005)*

EN 61000-4-6:2014, *Electromagnetic compatibility (EMC) — Part 4-6: Testing and measurement techniques — Immunity to conducted disturbances induced by radio-frequency fields (IEC 61000-4-6:2013)*

EN 61000-4-8:2010, *Electromagnetic compatibility (EMC) — Part 4-8: Testing and measurement techniques — Power frequency magnetic field immunity test (IEC 61000-4-8:2009)*

EN 61000-4-11:2004, *Electromagnetic compatibility (EMC) — Part 4-11: Testing and measurement techniques — Voltage dips, short interruptions and voltage variations immunity tests (IEC 61000-4-11:2004)*

EN 61000-4-29:2000, *Electromagnetic compatibility (EMC) — Part 4-29: Testing and measurement techniques — Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests (IEC 61000-4-29:2000)*

EN 61000-6-1:2007, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1:2005)*

EN 61000-6-2:2005,<sup>4</sup> *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:2005)*

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<sup>2</sup> As impacted by EN 50545-1:2011/A1:2016.

<sup>3</sup> As impacted by EN 61000-4-3:2006/A1:2008 and EN 61000-4-3:2006/A2:2010.

<sup>4</sup> As impacted by EN 61000-6-2:2005/AC:2005.

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EN 61000-6-3:2007,<sup>5</sup> *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006)*

EN 61000-6-4:2007,<sup>6</sup> *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2006)*

IEC 60050-161, *International Electrotechnical Vocabulary — Chapter 161: Electromagnetic compatibility*

### 3 Terms and Definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161 and the following apply.

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

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

If there are no terms and definitions provided, use the following

#### 3.1

##### **type 1 apparatus**

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

#### 3.2

##### **type 2 apparatus**

apparatus intended for use in industrial environments, as described in EN 61000-6-2 and EN 61000-6-4

#### 3.3

##### **port**

particular interface of the specified apparatus with the external electromagnetic environment

Note 1 to entry: See Figure 1.

#### 3.4

##### **enclosure port**

physical boundary of the apparatus through which electromagnetic fields may radiate or impinge on

#### 3.5

##### **signal port**

port at which a conductor or cable intended to carry signals is connected to the apparatus

Note 1 to entry: Examples are analogue inputs, outputs and control lines; data busses; communication networks, etc.

Note 2 to entry: Within this document, ports intended to be connected with earth potential for functional reasons (functional earth ports) are considered as I/O ports.

<sup>5</sup> As impacted by EN 61000-6-3:2007/A1:2011 and EN 61000-6-3:2007/A1:2011/AC:2012.

<sup>6</sup> As impacted by EN 61000-6-4:2007/A1:2011



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**3.6****power port**

port at which a conductor or cable carrying the primary electrical power needed for the operation (functioning) of an apparatus or associated apparatus is connected to the apparatus

**3.7****intrinsically safe circuit**

circuit in which any spark or any thermal effect produced in the conditions as specified in EN 60079-11, which include normal operation and specified fault conditions, is not capable of causing ignition of a given explosive atmosphere

**3.8****intrinsically safe port**

port connected to an intrinsically safe circuit

**3.9****sensor**

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

**3.10****remote sensor**

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

**3.11****potentially explosive atmosphere**

atmosphere which could become explosive

**3.12****safety barrier**

device for obtaining intrinsic safety of electrical apparatus for potentially explosive atmospheres

[SOURCE: EN 60079-11:2012, 8.6]  
<https://standards.iteh.ai/catalog/standards/sist/b4b39efe-a85c-4b10-bf81-1e02cd9e621e4/osist-pren-50270-2019>

**3.13****standard test gas**

test gas with a composition specified for each apparatus to be used for all tests unless otherwise stated

**3.14****measuring function of the apparatus**

generation, transmission or output of measured values or status information (e.g. fault, alarm)

**3.15****safety function of the apparatus**

function to be implemented by electrical apparatus for the detection and measurement of combustible gases, toxic and oxygen that is intended to achieve or maintain a safe state, in respect of a specific hazardous event

Note 1 to entry: The measuring and warning function of the apparatus including all associated outputs is always part of the safety function.

**3.16****DC distribution network**

local d.c. electricity supply network in the infrastructure of a certain site or building intended for connection of any type of equipment

Note 1 to entry: Connection to a local or remote battery is not regarded as a DC distribution network if such a link comprises only the power supply for a single piece of equipment.

[SOURCE: EN 61326-3-2:2008, 3.11]

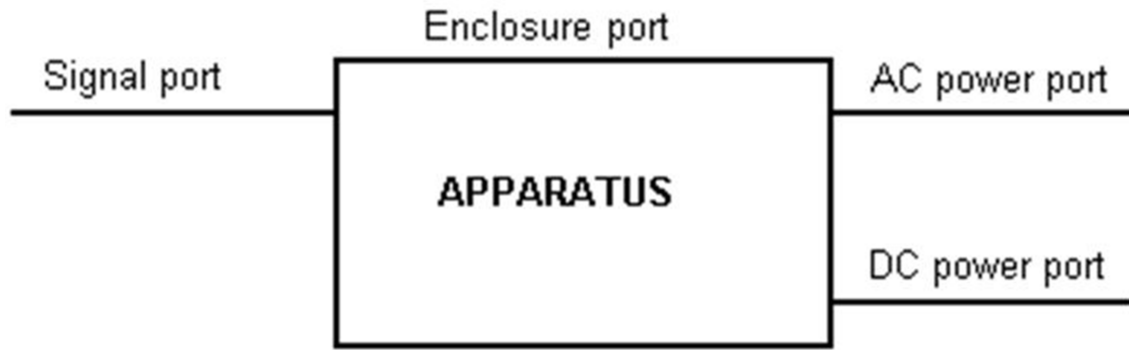


Figure 1 — Examples of ports

### 3.17

#### combustible gas

gas or vapour which, when mixed with air in a certain proportion, will form an explosive atmosphere

Note 1 to entry: For the purposes of this standard, the terms “combustible gas” and “flammable gas” are equivalent.

## 4 EMC test plan

### 4.1 General

An EMC test plan shall be established prior to testing. It shall contain, as a minimum, the elements given in 4.2 to 4.4. It shall also include:

- the type of apparatus (type 1 or 2);
- the specification of the safety function(s);
- the specification of the non-safety function(s);
- the specific pass / fail criteria as defined in Tables 1 to 4 for the relevant functions appropriate to criteria A, B or C.

It could be determined from consideration of the electrical characteristics and usage of a particular apparatus that some tests are inappropriate and therefore unnecessary. In such cases, the decision not to test shall be justified and recorded in the EMC test plan.

The tests shall be carried out as single tests in sequence. The sequence of testing is optional.

### 4.2 Configuration of the apparatus (EUT) during testing

#### 4.2.1 General

Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen within the scope of this standard often consists of systems with no fixed configuration. The kind, number and installation of different subassemblies within the apparatus may vary from system to system.

For simulating realistic EMC conditions (related both to emissions and immunity), the assembly of the apparatus shall represent a typical installation as specified by the manufacturer. Such tests shall be carried out as type tests under normal conditions as specified by the manufacturer in the instruction manual. External EMC protection devices or measures specified in the instruction manual for the apparatus shall be used or fitted for the tests.

#### 4.2.2 Composition of EUT

All devices, racks, modules, boards, etc. significant to EMC and belonging to the EUT shall be documented in the test plan. A rationale supporting the configuration of the EUT shall also be provided.

#### 4.2.3 Configuration of EUT, operation modes

If an EUT has a variety of configurations, the type test shall be made with that configuration having the maximum susceptibility. If necessary, the configuration shall be varied. Each type of module shall be tested at least once. The rationale for this selection shall be recorded in the EMC test plan. When designing the most susceptible configuration, possible electromagnetic interaction between modules of the apparatus shall be taken into consideration.

The manufacturer may elect to perform all tests either on a single EUT or more than one.

The test shall be performed in measuring mode.

For portable battery powered apparatus which can also be operated when connected to an external power supply, both operational modes (battery powered as well as externally supplied) shall be tested.

If the apparatus has sensors with different measuring principles (e.g. electrochemical sensors or catalytic sensors) the apparatus shall be tested with each type of sensor. If the apparatus has more than one measuring range for a particular sensor the most sensitive specified by the manufacturer shall be tested. If the apparatus is designed for the detection of a variety of gases where the target gas can be changed by changing the sensor of a given type only (e.g. electrochemical sensors) the sensor with the maximum EMC-susceptibility shall be tested.

If an apparatus consists of a central unit and additional separate equipment (e.g. remote sensors or printer), the control unit and the separate equipment may be tested separately if possible.

#### 4.2.4 I/O ports

If the apparatus has a large number of similar ports or ports with similar connections, then a sufficient number shall be selected to simulate actual operating conditions and to ensure that all the different types of termination are covered.

Connections between e.g. remote sensors or hand-held terminals with the respective apparatus shall be considered as I/O lines.

Where there are multiple I/O ports, which are all of the same type, connecting a cable to just one of those ports is sufficient, provided that it can be shown that the additional cables would not affect the results significantly.

The rationale for this selection shall be justified and recorded in the EMC test plan.

#### 4.2.5 Auxiliary equipment

When a variety of devices is provided for use with the EUT, at least one of each type of device shall be selected to simulate actual operating conditions. Auxiliary devices can be simulated.

#### 4.2.6 Cabling and earthing (grounding)

The cables and earth (ground) shall be connected to the EUT in accordance with the manufacturer's specifications.

### 4.3 Operation conditions of EUT during testing

#### 4.3.1 Test gases, alarm settings

For linear measuring principles, the tests shall be carried out with the apparatus showing a reading between 10 % and 90 % of full scale.