

**PLAHVATUSOHTLIKUD KESKKONNAD.  
OSA 29-1: GAASIDETEKTORID.  
PÕLEVGAASIDETEKTORITE TOIMIVUSNÕUDED**

**Explosive atmospheres - Part 29-1: Gas detectors -  
Performance requirements of detectors for flammable  
gases (IEC 60079-29-1:2016 , modified +  
IEC 60079-29-1:2016/A1:2020)**



**EESTI STANDARDI EESSÕNA****NATIONAL FOREWORD**

See Eesti standard EVS-EN 60079-29-1:2016+A1+A11:2022 sisaldb Euroopa standardi EN 60079-29-1:2016 ja selle muudatuste A1:2022 ja A11:2022 ingliskeelset teksti.	This Estonian standard EVS-EN 60079-29-1:2016+A1+A11:2022 consists of the English text of the European standard EN 60079-29-1:2016 and its amendments A1:2022 and A11:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.  Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.12.2016, muudatused A1 13.05.2022 ja A11 13.05.2022.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.  Date of Availability of the European standard is 23.12.2016, for A1 13.05.2022 and A11 13.05.2022.
Muudatusega A1 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega <b>[A1] [A1]</b> .  Muudatusega A11 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega <b>[A11] [A11]</b> .  Selles standardis on rahvusvahelise standardi ühismuudatused tähistatud püstkriipsuga teksti vasakul veerisel.  Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The start and finish of text introduced or altered by amendment A1 is indicated in the text by tags <b>[A1] [A1]</b> .  The start and finish of text introduced or altered by amendment A11 is indicated in the text by tags <b>[A11] [A11]</b> .  In this document, the common modifications to the International Standard are indicated by a vertical line in the left margin of the text.  The standard is available from the Estonian Centre for Standardisation and Accreditation.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 60079-29-1 + A1 + A11

December 2016, May 2022, May 2022

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English Version

Explosive atmospheres - Part 29-1: Gas detectors - Performance  
requirements of detectors for flammable gases  
(IEC 60079-29-1:2016 , modified + IEC 60079-29-  
1:2016/A1:2020)

Atmosphères explosives - Partie 29-1: DéTECTeurs de gaz -  
Exigences d'aptitude à la fonction des détecteurs de gaz  
inflammables  
(IEC 60079-29-1:2016 , modifiée + IEC 60079-29-  
1:2016/A1:2020)

Explosionsfähige Atmosphäre - Teil 29-1: Gasmessgeräte -  
Anforderungen an das Betriebsverhalten von Geräten für  
die Messung brennbarer Gase  
(IEC 60079-29-1:2016 , modifiziert + IEC 60079-29-  
1:2016/A1:2020)

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+ EN 60079-29-1:2016/A11:2022 E

## European foreword

The text of document 31/1257/FDIS, future edition 2 of IEC 60079-29-1, prepared by IEC/TC 31 "Equipment for explosive atmospheres" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60079-29-1:2016.

A draft amendment, which covers common modifications to IEC 60079-29-1 (31/1257/FDIS), was prepared by 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 potentially explosive atmospheres" and approved by CENELEC.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-06-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-12-23

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Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 60079-29-1:2016 are prefixed "Z".

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

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The text of the International Standard IEC 60079-29-1:2016 was approved by CENELEC as a European Standard with agreed common modifications.

**[A1] Amendment A1 European foreword**

The text of document 31/1525/FDIS, future IEC 60079-29-1/A1, prepared by IEC/TC 31 "Equipment for explosive atmospheres" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60079-29-1:2016/A1:2022.

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The text of the International Standard IEC 60079-29-1:2016/A1:2020 was approved by CENELEC as a European Standard without any modification. [A1]

**[A11] Amendment A11 European foreword**

This document (EN 60079-29-1:2016/A11:2022) has been prepared by CLC/TC 31 “Electrical apparatus for potentially explosive atmospheres”.

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# CONSOLIDATED VERSION

## VERSION CONSOLIDÉE



**Explosive atmospheres –  
Part 29-1: Gas detectors – Performance requirements of detectors for flammable  
gases**

**Atmosphères explosives –  
Partie 29-1: DéTECTEURS de gaz – Exigences d'aptitude à la fonction des  
déTECTEURS de gaz inflammables**



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IEC Central Office  
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CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
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Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases**

**Atmosphères explosives –  
Partie 29-1: DéTECTEURS de gaz – Exigences d'aptitude à la fonction des détECTEURS de gaz inflammables**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**EXPLOSIVE ATMOSPHERES –**

**Part 29-1: Gas detectors – Performance requirements  
of detectors for flammable gases**

**FOREWORD**

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International Standard IEC 60079-29-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This second edition of IEC 60079-29-1 cancels and replaces the first edition of IEC 60079-29-1:2007 series and constitutes a technical revision.

The contents of the interpretation sheets 1 and 2 (2019-04) have been included in this copy.

Significant technical changes between IEC 60079-29-1, Edition 1 (2007), and IEC 60079-29-1, Edition 2 (2016), is as listed below:

Significant changes with respect to IEC 60079-29-1:2007

Changes		Type		
Changes	Clause	Minor and editorial changes	Extension	Major technical changes
Measuring range up to 20 % LEL (Modified requirements)	All		X	
Definitions (Additional clarifications)	0	X		
Manufacturer's claims (special applications requirements)	4.1.1	X		
General construction (Malfunction effects on safety related function)	4.2.1			C1
General indicating devices (portable equipment with visual and audible indication)	4.2.2.1			C2
Suppression of indication and measured values below zero (functional limits)	4.2.2.5			C3
Fault signals (Fault indication below minimum voltage limit, sensor disconnection and zero drift condition)	4.2.4			C4
Adjustments (Zero and sensitivity adjustments)	4.2.5			C5
Marking (Portable equipment protective case)	4.3		X	
Instruction Manual (Additions and clarifications)	4.4			C6
Samples and sequence of tests (Optical filter special sensitivity limits, and modification considerations)	5.2.2		X	
Preparation of equipment before testing (separate gas detection control units)	5.2.3	X		
Test gas (methane, and propane or butane for general purpose gas detector)	5.3.2			C7
General test methods (selectable range and wiring worst case conditions)	5.4.1		X	
Calibration curve (fixed volume fractions)	5.4.3.2			C8
Response to different gases (semiconductor and catalytic high gas concentration exposure)	5.4.3.3			C9
Stability (duration of test method)	5.4.4		X	
Alarm set point(s) (alarm set point test method)	5.4.5	X		
Temperature (portable) (temperature range and stabilization period)	5.4.6			C10
Temperature (all other equipment) (temperature range and stabilization period)	5.4.6		X	
Pressure (tolerance on pressure measurement)	5.4.7	X		
Humidity of test gas (test method clarification)	5.4.8	X		
Air velocity (test method clarification)	5.4.9	X		
Flow rate for aspirated equipment (test method clarification)	5.4.10	X		

Changes		Clause	Type		
Changes	Clause		Minor and editorial changes	Extension	Major technical changes
Vibration (test method clarification)	5.4.12	X			
Drop test for portable and transportable equipment (Automatic re-starting or shut-down requirement clarification)	5.4.13	X			
Warm-up time (user prompt requirement)	5.4.14				C11
High gas concentration operation above the measuring range (test method and requirement clarification)	5.4.16	X			
Battery capacity (test method clarification)	5.4.17	X			
Power supply variation (minimum supply voltage fault limit)	5.4.18				C12
Poisons (applicable only to Group I apparatus with catalytic or semiconductor sensors) (test method clarification)	5.4.20.2	X			
Electromagnetic compatibility (test methods and requirements)	5.4.21				C13
Field calibration kit (test method clarification)	5.4.22	X			
Software function (supporting documentation)	5.4.23		X		
Determination of time of response (test method clarification)	Annex B		X		

NOTE 1 The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version. More guidance may be found by referring to the Redline Version of the standard.

#### Explanations:

##### A) Definitions

###### **Minor and editorial changes**

Clarification decrease of technical requirements minor technical change editorial corrections.

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

###### **Extension**

Addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

###### **Major technical changes**

Addition of technical requirements increase of technical requirements.

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product conforming to the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products conforming to the preceding edition. For these changes additional information is provided in B) below.

NOTE 2 These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

**B) Information about the background of 'Major technical changes'**

- C1 Addition of malfunction effects not adversely affecting the safety related function (4.2.1).
- C2 Addition of visual and audible indication for portable equipment (4.2.2.1).
- C3 Addition of functional limits for suppression of indication and for measured values below zero (4.2.2.5).
- C4 Addition of requirements for fault indication below minimum voltage limit, sensor disconnection and zero drift condition (4.2.4).
- C5 Addition of requirements for zero and sensitivity adjustments (4.2.5).
- C6 Addition and clarification requirements for inclusion within the instruction manual (4.4).
- C7 Addition of methane and propane or butane as required test gases for general purpose gas detector (5.3.2).
- C8 Specification of fixed volume fractions which are expressed as a percentage of the measuring range (5.4.3.2).
- C9 Addition of requirement for semiconductor and catalytic sensors to be exposed to high gas concentration on response to different gases (5.4.3.3).
- C10 Addition of temperature range and stabilization period (5.4.6).
- C11 Addition of requirement where equipment prompts the user (5.4.14).
- C12 Addition of requirement for output functionality above the minimum supply voltage fault limit (5.4.18).
- C13 Addition of test methods and requirements for electromagnetic compatibility tests (5.4.21).

This bilingual version (2017-12) corresponds to the monolingual English version, published in 2016-07.

The text of this standard is based on the following documents:

FDIS	Report on voting
31/1257/FDIS	31/1266/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60079 series, under the general title *Explosive atmospheres*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## A1 AMENDMENT A1 FOREWORD

This amendment has been prepared by IEC technical committee 31 Equipment for explosive atmospheres

The text of this amendment is based on the following documents:

FDIS	Report on voting
31/1525/FDIS	31/1533/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

This part of EN 60079-29 specifies general requirements for construction, testing and performance, and describes the test methods that apply to portable, transportable and fixed equipment for the detection and measurement of flammable gas or vapour concentrations with air.

Guidance for the selection, installation, use and maintenance of gas detecting equipment is set out in EN 60079-29-2: *Explosive atmospheres – Part 29-2: Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen*.

Guidance for functional safety of fixed gas detection systems is set out in EN 60079-29-3: *Explosive atmospheres – Part 29-3: Gas detectors – Guidance on functional safety of fixed gas detection systems*.

General requirements for construction, testing and performance of open path detectors for flammable gases are set out in EN 60079-29-4: *Explosive atmospheres – Part 29-4: Gas detectors – Performance requirements of open path detectors for flammable gases*.

## EXPLOSIVE ATMOSPHERES –

### Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases

#### 1 Scope

This part of EN 60079-29 specifies general requirements for construction, testing and performance, and describes the test methods that apply to portable, transportable and fixed equipment for the detection and measurement of flammable gas or vapour concentrations with air. The equipment, or parts thereof, is intended for use in explosive atmospheres and in mines susceptible to firedamp.

This part of EN 60079-29 is applicable to flammable gas detection equipment with a measuring range up to any volume fraction as declared by the manufacturer, and which is intended to provide an indication, alarm or other output function; the purpose of which is to indicate a potential explosion hazard and in some cases, to initiate automatic or manual protective action(s).

For the purposes of this part of EN 60079-29, the term "indicating up to a volume fraction of X % or X %LFL" includes equipment with an upper limit of the measuring range equal to or less than X % or X %LFL.

This part of EN 60079-29 is applicable to equipment, including the integral sampling systems of aspirated equipment, intended to be used for commercial, industrial and non-residential safety applications.

This part of EN 60079-29 does not apply to external sampling systems, or to equipment of laboratory or scientific type, or to equipment used only for process monitoring and/or control purposes. It also does not apply to open path (line of sight) detectors which are within the scope of EN 60079-29-4. Only equipment with very short optical paths intended for use where the concentration is uniform over the optical path are within the scope of this standard.

For equipment used for sensing the presence of multiple gases, this part of EN 60079-29 applies only to the detection of flammable gas or vapour.

This part of EN 60079-29 supplements and modifies the general requirements of EN 60079-0. Where a requirement of this standard conflicts with a requirement of EN 60079-0, the requirement of EN 60079-29-1 takes precedence.

*deleted text*

NOTE 1 All equipment calibrated on specific gases or vapours can not be expected to correctly indicate on other gases or vapours.

For the purposes of this standard, the terms "lower flammable limit (LFL)" and "lower explosive limit (LEL)" are deemed to be synonymous, and likewise the terms "upper flammable limit (UFL)" and "upper explosive limit (UEL)" are deemed to be synonymous. For ease of reference, the two abbreviations LFL and UFL may be used hereinafter to denote these two sets of terms. It should be recognized that particular authorities having jurisdiction may have overriding requirements that dictate the use of one of these sets of terms and not the other.

NOTE 2 Indication of concentration in %<sub>v/v</sub> or vol ppm can also be available for equipment which measures up to 100 %LFL or 20 %LFL. In that case, units of measurement might need to be selected in agreement with the manufacturer when verifying the performance requirements of Annex A.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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*

IEC 60050-426, *International Electrotechnical Vocabulary – Part 426: Equipment for explosive atmospheres*

EN 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

EN 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

EN 60079-20-1, *Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data*

*deleted text*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 60079-0 and the following apply. Additional definitions applicable to explosive atmospheres can be found in IEC 60050-426.

### 3.1

#### gas properties

##### 3.1.1

##### ambient air

normal atmosphere surrounding the equipment

##### 3.1.2

##### clean air

air that is free of gases or vapours which the sensor is sensitive to or which influence the performance of the sensor

##### 3.1.3

##### flammable 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 part of EN 60079-29, the term "flammable gas" includes flammable vapours.

Note 2 to entry: For the purposes of this part of EN 60079-29, the terms "combustible gas" and "flammable gas" are equivalent.

##### 3.1.4

##### lower flammable limit

LFL

concentration of flammable gas or vapour in air, below which an explosive gas atmosphere does not form