IEC 60079-29-2

Edition 2.0 2015-03

INTERNATIONAL STANDARD

Explosive atmospheres – Part 29-2: Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 29.260.20

ISBN 978-2-8322-2342-0

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FOREWORD

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International Standard IEC 60079-29-2 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

This edition includes the following significant changes with respect to the previous edition:

		Type		
Changes	Clause	Minor and editorial changes	Extension	Major technical changes
Addition of group 1 to scope	1		x	
Addition of Open Path Gas Detection	3, 4.6, 5.4, 6.2.3.5, 8.2, 8.6, 8.7. 8.8, 11, A4		x	
Changed “combustible” to “flammable”	Throughout	x		
Addition of specific applications	4.5		x	
Improvements to sampling systems	6.2.3.4, 8.2.3, 8.5, 11.2.2	x		

NOTE 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:

1) **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.

2) **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.

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

3) **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 in conformity with 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 in conformity with the preceding edition.

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

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

FDIS	Report on voting
31/1169/FDIS	31/1179/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.

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

A list of all parts in the IEC 60079 series, published 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.

A bilingual version of this standard may be issued at a later date.

INTRODUCTION

Flammable gas detection equipment may be used whenever there is the possibility of a hazard to life or property caused by the accumulation of a flammable gas-air mixture. Such equipment can provide a means of reducing the hazard by detecting the presence of a flammable gas and issuing suitable audible or visual warnings. Gas detectors may also be used to initiate precautionary steps (for example plant shutdown, evacuation, and operation of fire extinguishing procedures).

Equipment may be used to monitor a gas atmosphere below the lower flammable limit in circumstances where accumulation of gas may result in a concentration of the gas/air mixture to potentially explosive levels. Performance requirements for gas detecting equipment for such purposes are set out in IEC 60079-29-1 and IEC 60079-29-4. Guidance for functional safety of fixed gas detection systems are set out in IEC 60079-29-3.

However performance capability alone cannot ensure that the use of such equipment will properly safeguard life or property where flammable gases may be present. The level of safety obtained depends heavily upon correct selection, installation, calibration and periodic maintenance of the equipment, combined with knowledge of the limitations of the detection technique required. This cannot be achieved without responsible informed management.

An additional hazard to life is the toxicity of some gases and of the vapours of all liquids except water. It is not generally appreciated that all flammable vapours are potentially toxic at concentration levels which are very small fractions of their respective lower flammable limits. Equipment covered by IEC 60079-29-1 and IEC 60079-29-4 is not specifically intended for toxic protection, and additional personal protection precautions will normally be needed where personnel could be exposed to toxic vapours.

Portable equipment covered by IEC 60079-29-1 and IEC 60079-29-2 commonly have additional detectors for specific toxic gases and also for oxygen deficiency. Users are cautioned that even mild oxygen deficiency may be due to toxic concentrations of some other gas or vapour, which may not be detectable or adequately detected by the equipment in use.

General requirements for the handbook or manual of any particular flammable gas detection equipment are specified in IEC 60079-29-1 and IEC 60079-29-4. These standards provide some necessary background knowledge on the points mentioned above.

This standard has been specifically written to cover all the functions necessary from selection to ongoing maintenance for a successful gas detection operation. Different clauses are appropriate for different tasks within this range of operations. Each clause has been written as stand-alone as far as practicable. This means that some information is repeated in different clauses but with a different emphasis.

Table 1 gives a broad suggestion as to the most relevant clauses to the typical tasks to be performed.

Table 1 – Typical Tasks and Most Relevant Causes

Tasks	Definitions	Basic information properties of gas and vapours	Measuring principles	Selection of equipment	Behaviour of gas releases	Design and installation of fixed gas detection systems	Use of portable and transportable flammable gas detection equipment	Training of operational personnel	Maintenance, routine procedures General administrative control	Measuring principles (full detail) (normative)	Environmental parameters (informative)
Function (Clause)	3	4	5	6	7	8	9	10	11	Annex A	Annex B
Authorities	+	+++	+++	+	+	-	-	-	+	-	-
General management	+	+++	+++	+	+	-	-	+	+	-	+
Selection	+++	+++	+	+++	+++	+	++	-	+	+++	+++
Design engineering / management	+++	+++	+	+++	+++	+++	-	-	-	+++	+++
Installation engineering / management	+++	+++	+	++	+++	+++	-	-	-	+++	+++
Installation, technical	++	+++	++	++	++	++	-	-	-	+	++
Commissioning	+++	+++	++	+	++	+++	-	++	+	-	-
Operations management	++	+++	++	+	+	++	++	+++	+++	+	+++
Operation training	+++	+++	+	+	+	+++	+++	+++	+++	+++	+++
Servicing / Calibration	+++	+++	-	-	-	++	++	+	+++	++	++
Repair	++	+++	++	-	-	+	+	+	+++	++	-

"+++" Most appropriate

"++" Advisable

"+" Useful

"-" Not applicable

It should be noted that Clause 5 is a simplified version of Annex A.

This standard makes recommendations on how to establish maintenance and calibration intervals. In certain countries there are mandatory general or industry-specific regulations which must be followed as a minimum requirement.

EXPLOSIVE ATMOSPHERES –

Part 29-2: Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen

1 Scope

This part of IEC 60079-29 gives guidance on, and recommended practice for, the selection, installation, safe use and maintenance of electrically operated Group II equipment intended for use in industrial and commercial safety applications and Group I equipment in underground coal mines for the detection and measurement of flammable gases complying with the requirements of IEC 60079-29-1 or IEC 60079-29-4.

This standard is applicable for oxygen measurement for the purpose of inertisation where explosion protection is provided by the exclusion of oxygen instead of measuring the flammable gases or vapours present. A similar application is measuring oxygen when inertising a goaf (mined out) area in an underground coal mine.

This standard is a compilation of practical knowledge to assist the user, and applies to equipment, instruments and systems that indicate the presence of a flammable or potentially explosive mixture of gas or vapour with air by using an electrical signal from a gas sensor to produce a meter reading, to activate a visual or audible pre-set alarm or other device, or any combination of these.

Such equipment may be used as a means of reducing the risk whenever there is the possibility of a risk to life or property specifically due to the accumulation of a flammable gas-air mixture, by providing such warnings. It may also be used to initiate specific safety precautions (e.g. plant shutdown, evacuation, fire extinguishing procedures).

This standard is applicable to fixed installations and transportable equipment. Similarly it is applicable to the safe use of portable equipment. Since much modern equipment of this type also includes oxygen deficiency detection and/or specific toxic gas sensors, some additional guidance is given for these topics.

For the purposes of this standard, except where specifically stated otherwise, flammable gases include flammable vapours.

Mists are not covered by this standard due to measurement techniques currently used.

This standard applies to Group II equipment (i.e. equipment intended for use in industrial and commercial safety applications, involving areas classified in accordance with IEC 60079-10-1) and Group I equipment.

For the purposes of this standard, equipment includes

a) fixed equipment including equipment mounted on a vehicle;

b) transportable equipment; and

c) portable equipment.

This standard is not intended to cover, but may provide useful information, for the following:

a) equipment intended only for the detection of non-flammable toxic gases;

b) equipment of laboratory or scientific type intended only for analysis or measurement purposes;

c) equipment intended only for process control applications;

d) equipment intended for applications in explosives processing and manufacture;

e) equipment intended for the detection of a explosive atmosphere resulting from dust or mist in air.

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.

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

IEC 60079-10-1:2008, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60079-10-2, *Explosive atmospheres – Part 10-2: Classification of areas – Combustible dust atmospheres*

IEC 60079-13, *Explosive atmospheres – Part 13: Equipment protection by pressurized room "p"*

IEC 60079-17, *Explosive atmospheres – Part 17: Electrical installations inspection and maintenance*

IEC 60079-19, *Explosive atmospheres – Part 19: Equipment repair, overhaul and reclamation*

IEC 60079-29-1:2007, *Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases*

IEC 60079-29-4, *Explosive atmospheres – Part 29-4: Gas detectors – Performance requirements of open path detectors for flammable gases*

IEC 61285, *Industrial-process control – Safety of analyser houses*