

SLOVENSKI STANDARD

SIST EN 60079-29-3:2014

01-november-2014

Eksplozivne atmosfere - 29-3. del: Plinski detektorji - Navodilo o funkcijski varnosti fiksnih sistemov za odkrivanje plina (IEC 60079-29-3:2014)

Explosive atmospheres - Part 29-3: Gas detectors - Guidance on functional safety of fixed gas detection systems (IEC 60079-29-3:2014)

Explosionsfähige Atmosphäre - Teil 29-3: Gasmessgeräte - Leitfaden zur funktionalen Sicherheit von ortsfesten Gaswarnsystemen (IEC 60079-29-3:2014)

Atmosphères explosives - Partie 29-3: Détecteurs de gaz - Recommandations relatives à la sécurité fonctionnelle des systèmes fixes de détection de gaz (CIE 60079-29-3:2014)

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13.320	Alarmni in opozorilni sistemi	Alarm and warning systems
29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres

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EUROPEAN STANDARD

EN 60079-29-3

NORME EUROPÉENNE

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English Version

Explosive atmospheres - Part 29-3: Gas detectors - Guidance on functional safety of fixed gas detection systems (IEC 60079-29-3:2014)

Atmosphères explosives - Partie 29-3: Détecteurs de gaz - Recommandations relatives à la sécurité fonctionnelle des systèmes fixes de détection de gaz
(CEI 60079-29-3:2014)

Explosionsfähige Atmosphäre - Teil 29-3: Gasmessgeräte - Leitfaden zur funktionalen Sicherheit von ortsfesten Gaswarnsystemen
(IEC 60079-29-3:2014)

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

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 31/1105A/FDIS, future edition 1 of IEC 60079-29-3, prepared by IEC TC 31, Equipment for explosive atmospheres, was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60079-29-3:2014.

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) 2015-02-01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-05-01

This part of IEC 60079-29 is to be used in conjunction with the following standards:

- IEC 60079-0, Explosive atmospheres – Part 0: Equipment – General requirements
- IEC 60079-29-1, Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases
- IEC 60079-29-2, Explosive atmospheres – Part 29-2: Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen
- IEC 60079-29-4, Explosive atmospheres – Part 29-4: Gas detectors – Performance requirements of open path detectors for flammable gases

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Endorsement notice

The text of the International Standard IEC 60079-29-3:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60079-1	NOTE	Harmonised as EN 60079-10-1.
IEC 61511-1	NOTE	Harmonised as EN 61511-1.
IEC 61511-2	NOTE	Harmonised as EN 61511-2.
IEC 61511-3	NOTE	Harmonised as EN 61511-3.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here:

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60079-29-1 (mod)	-	Explosive atmospheres -- Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases	EN 60079-29-1	-
IEC 60079-29-2	2007	Explosive atmospheres -- Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen	+AA EN 60079-29-2	2007
IEC 60079-29-4 (mod)	-	Explosive atmospheres -- Part 29-4: Gas detectors - Performance requirements of open path detectors for flammable gases	+EN 60079-29-2:2007/corrigendum Dec. 2007 EN 60079-29-4	2007 -
IEC 61508	series	Functional safety of electrical/electronic/programmable electronic safety-related systems	+AA EN 61508	series

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IEC 60079-29-3

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Explosive atmospheres –
Part 29-3: Gas detectors – Guidance on functional safety of fixed gas detection systems

Atmosphères explosives –
Partie 29-3: Détecteurs de gaz – Recommandations relatives à la sécurité fonctionnelle des systèmes fixes de détection de gaz

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –**Part 29-3: Gas detectors – Guidance on
functional safety of fixed gas detection systems**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60079-29-3 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This part of IEC 60079-29 is to be used in conjunction with the following standards:

- IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*
- IEC 60079-29-1, *Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases*
- IEC 60079-29-2, *Explosive atmospheres – Part 29-2: Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen*
- IEC 60079-29-4, *Explosive atmospheres – Part 29-4: Gas detectors – Performance requirements of open path detectors for flammable gases*

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

FDIS	Report on voting
31/1105A/FDIS	31/1117/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 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 web site 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.

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INTRODUCTION

Fixed gas detection systems have been used for many years to perform safety instrumented functions. Like any instrumented system, a fixed gas detection system commonly comprises of a single or multiple gas detector input(s), a control unit and a single or multiple final element(s) or output(s). Additional peripheral equipment may be incorporated into a fixed gas detection system e.g. a gas sampling system or a gas conditioning system. If a fixed gas detection system, including any relevant peripheral equipment is to be effectively used for safety instrumented functions, it is essential that the total system achieves certain minimum standards and performance levels.

It is important to understand that the number of sensing points and their appropriate location, their redundancy, the management of regular maintenance, specifically response checking or calibration, and other gas detection specific features (such as design of gas sampling systems) are all likely to have a far greater effect on the integrity of the overall Safety Instrumented System (SIS) than the required Safety Integrity Level (SIL) or SIL-capability of any of the individual functional units. This, however, does not exclude the requirement for each Safety Instrumented Function (SIF) to have a stand-alone functional integrity.

This international standard addresses the minimum standards and performance levels of a fixed gas detection system which is based on the use of electrical, electronic or programmable electronic systems (E/E/PES) for any application where there is either a risk reduction target stated or if the gas detection system is used as an additional safe guarding system.

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This international standard does not apply to portable gas detectors or fixed gas detection systems when there is no risk reduction target stated. However, this standard could be used as a best practice document for such devices or systems.

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The expression 'gas detection system' within this international standard is generic and applies to standalone fixed gas detectors, which might have their own internal alarm trip levels and switching outputs up to complex standalone fixed gas detection systems (Annex A – Typical Applications).

This international standard takes into consideration the possible complexity of the supply chain which a gas detection manufacturer, seller or system integrator might encounter which includes, but is not limited to:

- the use of standalone gas detectors which are integrated into an overall safety system by a gas detection equipment manufacturer, seller or system integrator (or equivalent)
- the design and use of fixed gas detection sub-systems, including any associated and/or peripheral gas detection equipment which are integrated into an overall safety system by a gas detection equipment manufacturer, seller or system integrator (or equivalent)
- the design and use of a complete fixed gas detection system, including associated and/or peripheral gas detection equipment which is the overall safety system

NOTE 1 IEC 61508 Parts 1, 2 and 3 cover the design of the stand-alone gas detector, control unit or final element. Guidance on the design of peripheral equipment is included within this international standard.

Before this international standard can be applied, it is important to understand and categorise the application of the fixed gas detection system. The three main applications are:

- as a prevention system – the total system or an individual instrumented control loop has a safety function and safety integrity clearly defined.
- as a mitigation system – the total system or an individual instrumented control loop has a safety function and safety integrity clearly defined.
- as an additional safe guarding system – this covers those fixed gas detection systems or individual instrumented control loops which operate in parallel (secondary) to an

instrumented safety system, where the demand on the fixed gas detection system or individual instrumented control loop is only when the primary instrumented safety system fails or another layer of protection fails.

Under no circumstances should the use of an additional safeguarding gas detection system contribute to the Hardware Fault Tolerance (HFT) declaration for the instrumented safety system.

A fixed gas detection system, as shown in Figure 1, may operate several times per year subject to the application, therefore this international standard accepts that the demand rate associated with 'on demand' (low demand) should be specified in the safety requirements (e.g. a reference could be "> 1/yr but <10/yr").

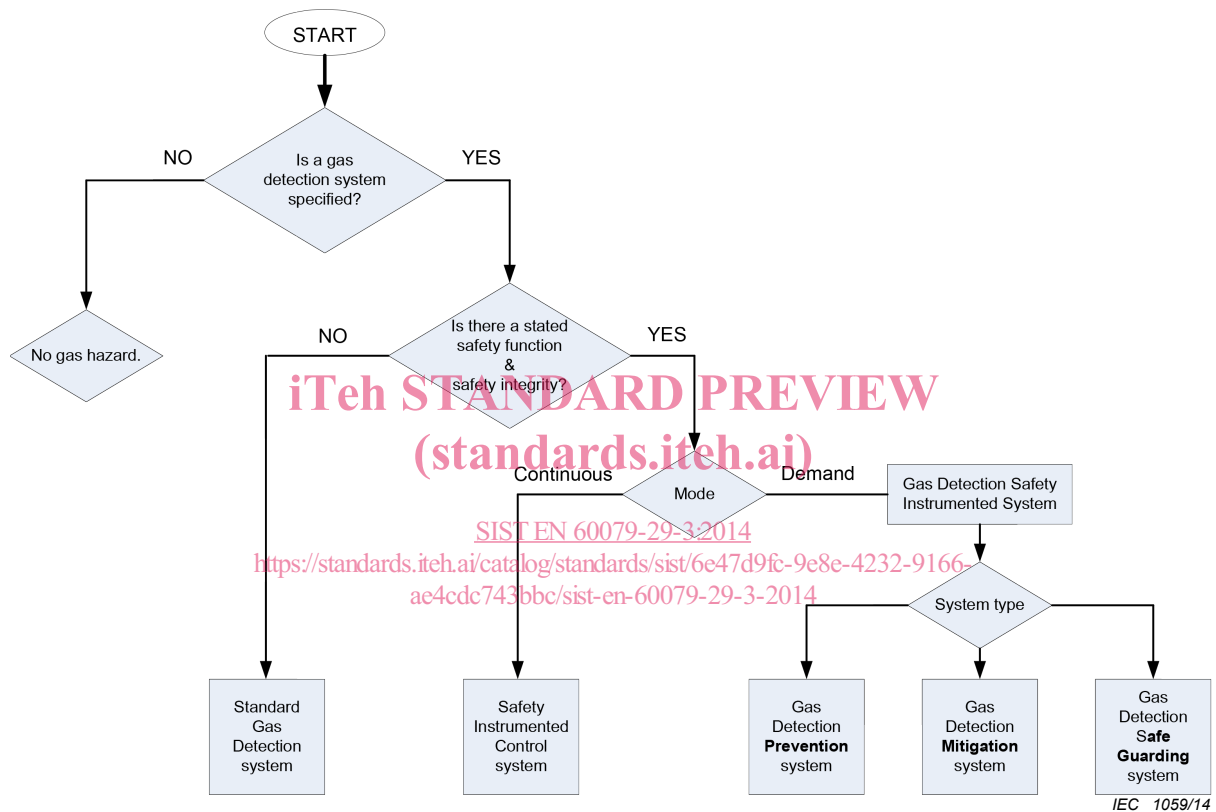


Figure 1 – Gas Detection System Architecture

To assist with the possible complexity and unique requirements associated with fixed gas detection systems, a fixed gas detection system may be broken down into functional units. Each functional unit can vary in complexity; a functional unit may be a simple gas detector or a combination of components which form peripheral equipment. Each functional unit is independently assessed against this international standard and/or IEC 61508 during the initial design phase of the functional unit, thus allowing safety data to be contributed to a functional unit.

NOTE 2 Basic elements of a sub-system/system (e.g. a gas detector, logic controller/solver, etc.) are designed as a product in compliance with IEC 61508 Parts 1, 2 and 3.

Each functional unit is then assembled in line with this international standard to deliver a complete fixed gas detection system. It is not necessary to re-assess individual functional units when they are used in a different configuration – it is only necessary to evaluate the combination of functional units.

This international standard is based on the safety lifecycle model detailed in IEC 61508, but adds additional and supportive information to assist with particular phases of this typical safety lifecycle.

This international standard specifies those requirements under 'Functional Safety Management' which all persons or companies who are involved in the supply chain of a fixed gas detection system should comply with.

NOTE 3 Functional Safety Management applies to all stages of the safety lifecycle irrespective of the product, subsystem, system supply or service being supplied.

For this document, the SIL capability excludes consideration of gas detection coverage or the transport of gas or vapour to the measuring point – IEC 60079-29-2 is pertinent to these two subjects.

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

Table 1 – Typical Job Descriptions and Most Relevant Clauses

Applies to	Definitions	Conformance to this International standard	Gas detection unique features	Functional safety management	General requirements	Gas detection unique requirements	Alternative control units (logic solvers)	Factory acceptance testing	Installation and commissioning	System validation (SAT)	Operation and maintenance	System modification	System de-commissioning	Documentation
Clause	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Consultant														
Contractor		+++		+++										
Vendor		+++		+++										
System Integrator		+++		+++										
Manufacturer		+++		+++										
NOTE Each category above will have personnel in several of the categories below.														
General management	+	+	+		+	+	+	+	+	+	++	++	+	+
Design engineering / management	+++	+	+++		+++	+++	+++	+	+	+	++	+++	++	++
System engineer / management	+++	+	+++		+++	+++	+++	+++	++	++	+	+++	++	++
Installation engineering / management	++	+	++		+	++	+	+	+++	++	+	++	++	++
Commissioning engineer / management	++	+	++		++	++	+	+	+++	++	+	++	++	++
Service engineer / management	++	+	++		++	++	+	+	++	++	+++	+++	+++	++
Quality engineer / management	++	+	+++		+++	+++	+	+++	++	+++	+	++	+	+++
Training officers	+++	+	+++		+++	+++	++	+	+	+	+++	+	+	++
Operation & maintenance	+	+	++		+	++	+	++	+	+++	+++	+++	+++	+++
“+++” Most appropriate “++” Advisable “+” Useful The end-user, regulator and certification authorities need to be familiar with the entire family of IEC 61508 standards. NOTE See Annex B for guidance on the life cycle of gas detection.														