
Električne naprave za eksplozivne plinske atmosfere - 25. del: Lastnovarni sistemi (IEC 60079-25:2003)

Electrical apparatus for explosive gas atmospheres - Part 25: Intrinsically safe systems

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Electrical apparatus for explosive gas atmospheres
Part 25: Intrinsically safe systems
(IEC 60079-25:2003)

Matériel électrique pour atmosphères
explosives gazeuses
Partie 25: Systèmes de sécurité
intrinsèque
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Elektrische Betriebsmittel für
gasexplosionsgefährdete Bereiche
Teil 25: Eigensichere Systeme
(IEC 60079-25:2003)

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

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 31G/115/FDIS, future edition 1 of IEC 60079-25, prepared by SC 31G, Intrinsically-safe apparatus, of IEC TC 31, Electrical apparatus for explosive atmospheres, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60079-25 on 2003-12-02.

This European Standard supersedes EN 50039:1980.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-12-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60079-25:2003 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60060-1	- ¹⁾	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991 ²⁾
IEC 60079-0	- ¹⁾	Electrical apparatus for explosive gas atmospheres Part 0: General requirements	EN 60079-0	- ³⁾
IEC 60079-11	1999	Part 11: Intrinsic safety "i"	-	-
IEC 60079-14	2002	Part 14: Electrical installations in hazardous areas (other than mines)	EN 60079-14	2003

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¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

³⁾ To be published.

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**Matériel électrique pour atmosphères
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**Partie 25:
Systèmes de sécurité intrinsèque**

**Electrical apparatus for explosive
gas atmospheres –**

**Part 25:
Intrinsically safe systems**

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CONTENTS

FOREWORD	7
1 Scope	11
2 Normative references.....	11
3 Definitions	11
4 Descriptive system document	13
5 Grouping and classification.....	15
6 System categories	15
6.1 General	15
6.2 Category "ia"	17
6.3 Category "ib"	17
7 Ambient temperature rating.....	17
8 Field wiring	17
9 Earthing and bonding of intrinsically safe systems	17
10 Protection against lightning and other electrical surges.....	19
11 Assessment of an intrinsically safe system	21
11.1 General	21
11.2 Analysis of inductive circuits.....	25
11.3 Failures in field wiring.....	25
11.4 Type verifications and type tests.....	25
12 Marking	25
Annex A (normative) Assessment of a simple intrinsically safe system.....	27
Annex B (normative) Assessment of circuits with more than one source of power	31
Annex C (informative) Interconnection of non-linear and linear intrinsically safe circuits.....	39
Annex D (normative) Verification of inductive parameters.....	113
Annex E (informative) A possible format for descriptive systems drawings and installation drawings.....	117
Annex F (informative) Surge protection of an intrinsically safe circuit	123

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Figure 1 – Systems analysis.....	23
Figure A.1 – Interconnection of intrinsically safe apparatus with associated apparatus.....	29
Figure B.1 – Sources of power connected in series.....	35
Figure B.2 – Sources of power connected in parallel.....	35
Figure B.3 – Sources of power not deliberately connected	37
Figure C.1a) – Linear characteristics	41
Figure C.1b) – Trapezoidal characteristics	41
Figure C.1c) – Rectangular characteristics	41
Figure C.1 – Equivalent circuit and output characteristic of resistive circuits	41

Figure C.2a) – Series connection with voltage addition.....	43
Figure C.2b) – Series connection with voltage addition and possibly current addition	43
Figure C.2c) – Parallel connection with current addition	43
Figure C.2d) – Parallel connection with current and possibly voltage addition	45
Figure C.2e) – Series or parallel connection with current and voltage addition	45
Figure C.2 – Current and/or voltage addition for interconnections	45
Figure C.3 a) – Output characteristics	53
Figure C.3 b) – Equivalent circuit	53
Figure C.3 – Output characteristic and equivalent circuit of a source with trapezoidal characteristic	53
Figure C.4 – Example of an interconnection	61
Figure C.5 – Sum characteristics for the circuit as given in Figure C.4	63
Figure C.6a) – Current and voltage addition	67
Figure C.6b) – Voltage addition	67
Figure C.6 – Current and/or voltage addition for the example given in Figure C.4.....	67
Figure C.7a) – Diagram for 0,15 mH.....	71
Figure C.7b) – Diagram for 0,5 mH.....	75
Figure C.7c) – Diagram for 1 mH.....	79
Figure C.7d) – Diagram for 2 mH.....	83
Figure C.7e) – Diagram for 5 mH.....	87
Figure C.7 – Limit curve diagram for universal source characteristic – Group IIC	89
Figure C.8a) – Diagram for 0,15 mH.....	91
Figure C.8b) – Diagram for 0,5 mH.....	95
Figure C.8c) – Diagram for 1 mH.....	99
Figure C.8d) – Diagram for 2 mH.....	103
Figure C.8e) – Diagram for 5 mH.....	107
Figure C.8 – Limit curve diagram for universal source characteristic – Group IIB	109
Figure C.9 – Copy pattern for universal source diagrams	111
Figure D.1 – Typical inductive circuit.....	115
Figure E.1 – Typical block diagram for IS system descriptive system document	119
Figure E.2 – Typical installation drawing for IS system.....	121
Figure F.1 – Surge protection requirements of an instrument loop.....	127
SIST EN 60079-25:2004	
Table C.1 – Parameters necessary to describe the output characteristic	49
Table C.2 – Assignment of diagrams to apparatus groups and inductances.....	57

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –

Part 25: Intrinsically safe systems

FOREWORD

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International Standard IEC 60079-25 has been prepared by subcommittee 31G: Intrinsically safe apparatus, of IEC technical committee 31: Electrical apparatus for explosive atmospheres.

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

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FDIS42fa8d94/sis-en-60079-25 Report on voting	
31G/115/FDIS	31G/121/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.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

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ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –

Part 25: Intrinsically safe systems

1 Scope

1.1 This part of IEC 60079 contains the specific requirements for construction and assessment of intrinsically safe electrical systems, type of protection “i”, intended for use, as a whole or in part, in explosive atmospheres in Group II locations. This standard is intended for use by the designer of the system who may be a manufacturer, a specialist consultant or a member of the end-user’s staff.

1.2 This standard supplements IEC 60079-11, the requirements of which apply to electrical apparatus used in intrinsically safe electrical systems.

1.3 The installation requirements of a Group II system designed in accordance with this standard are specified in IEC 60079-14.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60079-0, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements*

IEC 60079-11:1999, *Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety “i”*

IEC 60079-14:2002, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*

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3 Definitions

For the purposes of this document, the following definitions, specific to intrinsically safe electrical systems, apply. They supplement the definitions which are given in IEC 60079-0 and IEC 60079-11.

3.1

intrinsically safe electrical system

assembly of interconnected items of electrical apparatus, described in a descriptive system document, in which the circuits or parts of circuits, intended to be used in an explosive atmosphere, are intrinsically safe circuits

3.1.1**certified intrinsically safe electrical system**

electrical system conforming to 3.1 for which a certificate has been issued confirming that the electrical system complies with this standard

3.1.2**uncertified intrinsically safe electrical system**

electrical system conforming to 3.1 for which the knowledge of the electrical parameters of the items of certified intrinsically safe electrical apparatus, certified associated apparatus, simple apparatus and the knowledge of the electrical and physical parameters of the interconnecting wiring permit the unambiguous deduction that intrinsic safety is preserved

3.2**descriptive system document**

document in which the items of electrical apparatus, their electrical parameters and those of the interconnecting wiring are specified

3.3**system designer**

person who is responsible for the descriptive system document, has the necessary competence to fulfil the task and who is empowered to enter into the commitments on behalf of his employer

3.4**maximum cable capacitance (C_c)**

maximum capacitance of the interconnecting cable that can be connected into an intrinsically safe circuit without invalidating intrinsic safety

3.5**maximum cable inductance (L_c)**

maximum inductance of the interconnecting cable that can be connected into an intrinsically safe circuit without invalidating intrinsic safety

3.6**maximum cable inductance to resistance ratio (L_c/R_c)**

maximum value of the ratio inductance (L_c) to resistance (R_c) of the interconnecting cable that can be connected into an intrinsically safe circuit without invalidating intrinsic safety

3.7**linear power supply**

power source from which the available output current is determined by a resistor. The output voltage decreases linearly as the output current increases

3.8**non-linear power supply**

power supply where the output voltage and output current have a non-linear relationship

EXAMPLE A supply with a constant voltage output up to a constant current limit controlled by semiconductors.

4 Descriptive system document

A descriptive system document shall be created for all systems. The descriptive system document shall provide an adequate analysis of the level of safety achieved by the system.

Annex E comprises examples of typical diagrams, which illustrate the requirements of the descriptive system document.

The minimum requirements are as follows:

- a) block diagram of the system listing all the items of apparatus within the system;
- b) a statement of the group subdivision, temperature classification, category and ambient temperature rating in accordance with Clauses 5, 6 and 7;
- c) the requirements and permitted parameters of the interconnecting wiring in accordance with Clause 8;
- d) details of the earthing and bonding points of the systems in accordance with Clause 9. When surge protection devices are used, an analysis in accordance with Clause 10 shall also be included;
- e) where applicable the justification of the assessment of apparatus as 'simple apparatus' in accordance with IEC 60079-11 shall be included. In particular, where several pieces of simple apparatus are included, the analysis of the summation of their parameters shall be available;
- f) a unique identification of the descriptive system document shall be created;
- g) the system designer shall sign and date the document.

5 Grouping and classification

Intrinsically safe electrical systems shall be placed in Group II as defined in IEC 60079-0. The system as a whole or parts thereof shall be given a further subdivision of the classification as appropriate.

Apparatus within a Group II intrinsically safe system, intended for use in explosive atmospheres, shall be given a surface temperature class in accordance with IEC 60079-0 and IEC 60079-11.

NOTE 1 In Group II intrinsically safe electrical systems, or parts thereof, the subdivisions A, B, C may be different from those of the particular intrinsically safe electrical apparatus and associated electrical apparatus included in the system.

NOTE 2 Different parts of the same intrinsically safe electrical system may have different subdivisions (A, B, C). The apparatus used may have different surface temperature classes and different ambient temperature ratings.

6 System categories

6.1 General

Each part of an intrinsically safe electrical system intended for use in a explosive atmosphere shall be placed in a category either "ia" or "ib" in accordance with IEC 60079-11. The complete system need not necessarily be placed in a single category.

The descriptive system document shall specify the category of the system or, where necessary, the category of different parts of the system.

NOTE For example, where an instrument is primarily an "ib" instrument but which is designed for the connection of an "ia" sensor, such as a pH measuring instrument with its connected probe, the part of the system up to the instrument is "ib" and the sensor and its connections "ia".

Clause 11 contains details of the required assessment.

6.2 Category "ia"

Where the requirements applicable to electrical apparatus of category "ia" (see 5.2 of IEC 60079-11) are satisfied by an intrinsically safe system or part of a system considered as an entity, then that system or part of a system shall be placed in category "ia".

6.3 Category "ib"

Where the requirements applicable to electrical apparatus of category "ib" (see 5.3 of IEC 60079-11) are satisfied by an intrinsically safe system or part of a system considered as an entity, then that system or part of a system shall be placed in category "ib".

7 Ambient temperature rating

Where part or all the intrinsically safe system is specified as being suitable for operation outside the normal operating temperature range of $-20\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$, this shall be specified in the descriptive system document.

8 Field wiring

The electrical parameters of the interconnecting wiring upon which intrinsic safety depends and their derivation shall be specified in the descriptive system document. Alternatively, a specific type of cable shall be specified and the justification for its use included in the documentation. Where a specific type of cable is specified, then it shall comply with the relevant requirements of IEC 60079-14.

Where relevant, the descriptive system document shall also specify the permissible types of multicore cables as specified in IEC 60079-14, which each particular circuit may utilize. In the particular case where faults between separate circuits have not been taken into account, then a note shall be included on the block diagram of the descriptive system document stating the following: "where the interconnecting cable utilizes part of a multicore containing other intrinsically safe circuits, then the multicore must be in accordance with the requirements of a multicore type A or B as specified in IEC 60079-14".

9 Earthing and bonding of intrinsically safe systems

In general, an intrinsically safe circuit shall either be fully floating or bonded to the reference potential associated with the hazardous area at one point only. The level of isolation required (except at one point) is to be designed to withstand a 500 V insulation test in accordance with 6.4.12 of IEC 60079-11. Where this requirement is not met, then the circuit shall be considered to be earthed at that point. More than one earth connection is permitted on a circuit, provided that the circuit is galvanically separated into sub-circuits, each of which has only one earth point.

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Screens shall be connected to earth or the structure in accordance with IEC 60079-14. Where a system is intended for use in an installation where significant potential differences (greater than 10 V) between the structure and the circuit can occur, the preferred technique is to use a circuit galvanically isolated from external influences such as changes in ground potential at some distance from the structure. Particular care is required where part of the system is intended to be used in a zone 0 location.