

Electrical apparatus for explosive gas atmospheres —

Part 14: Electrical installations in hazardous areas (other than mines)

The European Standard EN 60079-14:1997 has the status of a
British Standard

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National foreword

This British Standard is the English language version of EN 60079-14:1997. It is identical with IEC 60079-14:1996. It supersedes BS 5345-1:1989 and BS 5345-3:1979, BS 5345-4:1977, BS 5345-5:1983, BS 5345-6:1978, BS 5345-7:1979 and BS 5345-8:1980 which will be withdrawn on 1 December 1999. The obsolescent Standard BS 4137:1967 is withdrawn. The UK participation in its preparation was entrusted by Technical Committee GEL/31, Electrical apparatus for explosive atmospheres, to Subcommittee GEL/31/11, Code of practice for electrical apparatus for explosive atmospheres, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 31 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

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Contents

	Page
National foreword	Inside front cover
Foreword	2
Text of EN 60079-14	5

English version

Electrical apparatus for explosive gas atmospheres Part 14: Electrical installations in hazardous areas (other than mines)

(IEC 60079-14:1996)

Matériel électrique pour atmosphères
explosives gazeuses
Partie 14: Installations électriques
dans les emplacements dangereux
(autres que les mines)
(CEI 60079-14:1996)

Elektrische Betriebsmittel für
gasexplosionsgefährdete Bereiche
Teil 14: Errichtung elektrischer Anlagen in
explosionsgefährdeten Bereichen
(ausgenommen Grubenbaue)
(IEC 60079-14:1996)

This European Standard was approved by CENELEC on 1997-03-11. 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.

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.

This European Standard exists 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 Central Secretariat has the same status as the official versions.

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CENELEC

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

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Foreword

The text of document 31J/47/FDIS, future edition 2 of IEC 60079-14, prepared by SC 31J, Classification of hazardous areas and installation requirements, of IEC TC 31, Electrical apparatus for explosive atmospheres, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60079-14 on 1997-03-11.

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) 1998-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1999-12-01

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, Annex A and Annex ZA are normative and Annex B is informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60079-14:1996 was approved by CENELEC as a European Standard without any modification.

Contents

	Page
Foreword	2
Introduction	5
1 Scope and object	5
2 Normative references	5
3 Definitions and terms	6
4 General	8
4.1 General requirements	8
4.2 Documentation	8
5 Selection of electrical apparatus (excluding cables and conduits)	8
5.1 Specific information	8
5.2 Selection according to zones	8
5.3 Selection according to the ignition temperature of the gas or vapour	9
5.4 Selection according to apparatus grouping	9
5.5 External influences	10
6 Protection from dangerous (incendive) sparking	10
6.1 Danger from live parts	10
6.2 Danger from exposed and extraneous conductive parts	10
6.3 Potential equalization	11
6.4 Static electricity	11
6.5 Lightning protection	11
6.6 Electromagnetic radiation	11
6.7 Cathodically protected metallic parts	11
7 Electrical protection	11
8 Emergency switch-off and electrical isolation	12
8.1 Emergency switch-off	12
8.2 Electrical isolation	12
9 Wiring systems	12
9.1 General	12
9.2 Cable systems for zone 0	13
9.3 Cable systems for zones 1 and 2	13
9.4 Conduit systems	14
10 Additional requirements for type of protection “d” — Flameproof enclosures	14
10.1 Solid obstacles	14
10.2 Protection of flameproof joints	14
10.3 Cable entry systems	15

	Page		Page
10.4 Motors supplied at varying frequency and voltage	16	Figure B.1 — Series connection — Summation of voltage	28
10.5 Conduit systems	16	Figure B.2 — Parallel connection — Summation of currents	28
11 Additional requirements for type of protection “e” — Increased safety	16	Figure B.3 — Series and parallel connections — Summations of voltages and summations of currents	29
11.1 Degree of protection of enclosures (IEC 34-5 and IEC 529)	16	Table 1 — Relationship between the temperature classes, surface temperatures and ignition temperature	9
11.2 Cage induction motors — Thermal protection in operation	17	Table 2 — Relationship between gas/vapour subdivision and apparatus subgroup	10
11.3 Wiring systems	17	Table 3 — Minimum distance of obstruction from the flameproof flange related to the gas/vapour subgroup of the hazardous area	14
11.4 Resistance heating devices	18	Table 4 — Assessment for T4 classification according to component size and ambient temperature	23
12 Additional requirements for type of protection “i” — Intrinsic safety	18	Table 5 — Use of spark and particle barriers	24
12.1 Introduction	18	Table 6 — Action to be taken when the pressurization with the protective gas fails for electrical apparatus without an internal source of release	24
12.2 Installations for zones 1 and 2	18		
12.3 Installations for zone 0	23		
13 Additional requirements for type of protection “p” — Pressurized apparatus	24		
13.1 Ducting	24		
13.2 Action to be taken on failure of pressurization	24		
13.3 Multiple pressurized enclosures with a common safety device	25		
13.4 Purging	25		
14 Additional requirements for apparatus for use in zone 2	25		
14.1 Degree of protection of enclosures (IEC 34-5 and IEC 529)	25		
14.2 Energy-limited apparatus and circuits	25		
14.3 Wiring systems	25		
14.4 Motors supplied at varying frequency and voltage	26		
Annex A (normative) Verification of intrinsically safe circuits with more than one associated apparatus with linear current/voltage characteristics	27		
Annex B (informative) Methods of determining the maximum system voltages and currents in intrinsically safe circuits with more than one associated apparatus with linear current/voltage characteristics	27		
Annex ZA (normative) Normative references to international publications with their corresponding European publications	30		
Figure 1 — Selection chart for cable entry devices into flameproof enclosures for cables complying with item b) of 10.3.2	15		
Figure 2 — Earthing of conducting screens	19		

Introduction

When electrical apparatus is to be installed in areas where dangerous concentrations and quantities of flammable gases, vapours, mists, ignitable fibres or dusts may be present in the atmosphere, protective measures are applied to reduce the likelihood of explosion due to ignition by arcs, sparks or hot surfaces, produced either in normal operation or under specified fault conditions.

This part of IEC 79 is supplementary to other relevant IEC standards, for example IEC 364 as regards electrical installation requirements, and also refers to IEC 79-0 and its associated standards for the construction, testing and marking requirements of suitable electrical apparatus.

By careful design of the electrical installation, it is frequently possible to locate much of the electrical apparatus in less hazardous or non-hazardous areas.

For an explosion to occur, an explosive atmosphere and a source of ignition need to co-exist. Protective measures aim to reduce to an acceptable level the likelihood that the electrical installation could become a source of ignition.

It has been found practical to classify hazardous areas into zones according to the likelihood of an explosive gas atmosphere being present (see IEC 79-10). Such classification allows appropriate types of protection to be specified for each zone.

Several types of protection are now available for electrical apparatus in hazardous areas (see IEC 79-0), and this standard gives the specific requirements for design, selection and erection of electrical installations in explosive atmospheres.

This standard is based on the assumption that electrical apparatus is correctly installed, tested, maintained and used in accordance with its specified characteristics.

In any industrial installation, irrespective of size, there may be numerous sources of ignition apart from those associated with electrical apparatus. Precautions may be necessary to ensure safety, but guidance on this aspect is outside the scope of this standard.

1 Scope and object

This part of IEC 79 contains the specific requirements for the design, selection and erection of electrical installations in explosive gas atmospheres.

These requirements are in addition to the requirements for installations in non-hazardous areas.

This standard applies to all electrical equipment and installations in hazardous areas whether permanent, temporary, portable, transportable or hand-held.

It applies to installations at all voltages.

This standard does not apply to

- electrical installations in mines susceptible to firedamp;

NOTE This standard may apply to electrical installations in mines where explosive gas atmospheres other than firedamp may be formed and to electrical installations in the surface installation of mines.

- electrical installations in areas where the hazard is due to ignitable dusts or fibres;
- inherently explosive situations, for example explosives manufacturing and processing;
- rooms used for medical purposes.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 79. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 79 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 34-5:1991, *Rotating electrical machines — Part 5: Classification of degrees of protection provided by enclosures of rotating electrical machines (IP code)*.

IEC 50(426):1990, *International Electrotechnical Vocabulary (IEV) — Chapter 426: Electrical apparatus for explosive atmospheres*.

IEC 60-1:1989, *High-voltage test techniques — Part 1: General definitions and test requirements*.

IEC 79-0:1983, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*.
Amendment 1 (1987)
Amendment 2 (1991)

IEC 79-1:1990, *Electrical apparatus for explosive gas atmospheres — Part 1: Construction and verification test of flameproof enclosures of electrical apparatus*.

IEC 79-2:1983, *Electrical apparatus for explosive gas atmospheres — Part 2: Electrical apparatus — type of protection “p”*.

IEC 79-5:1967, *Electrical apparatus for explosive gas atmospheres — Part 5: Sand-filled apparatus*.

IEC 79-6:1995, *Electrical apparatus for explosive gas atmospheres — Part 6: Oil-immersion “o”*.

IEC 79-7:1990, *Electrical apparatus for explosive gas atmospheres — Part 7: Increased safety “e”*.

IEC 79-10:1995, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas*.

IEC 79-11:1991, *Electrical apparatus for explosive gas atmospheres — Part 11: Intrinsic safety “i”*.

IEC 79-15:1987, *Electrical apparatus for explosive gas atmospheres — Part 15: Electrical apparatus with type of protection “n”*.

IEC/FDIS 79-17, *Electrical apparatus for explosive gas atmospheres — Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines)*¹⁾.

IEC 79-18:1992, *Electrical apparatus for explosive gas atmospheres — Part 18: Encapsulation “m”*.

IEC 332-1:1993, *Tests on electric cables under fire conditions — Part 1: Test on a single vertical insulated wire or cable*.

IEC 364-4-41:1992, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 41: Protection against electric shock*.

IEC 529:1989, *Degrees of protection provided by enclosure (IP code)*.

IEC 614-2-1:1982, *Specification for conduits for electrical installations — Part 2: Particular specifications for conduits — Section one: Metal conduits*.

Amendment 1 (1993)

IEC 614-2-5:1992, *Specification for conduits for electrical installations — Part 2: Particular specifications for conduits — Section 5: Flexible conduits*.

IEC 742:1983, *Isolating transformers and safety isolating transformers — Requirements*.

IEC 755:1983, *General requirements for residual current operated protective devices*.

3 Definitions and terms

[see IEC 50(426)]

For the purpose of this part of IEC 79, the following definitions apply.

3.1

explosive gas atmosphere

mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour or mist, in which after ignition, combustion spreads throughout the unconsumed mixture

3.2

hazardous area

area in which an explosive atmosphere is, or may be expected to be, present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus

3.3

non-hazardous area

area in which an explosive gas atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus

3.4

maximum surface temperature

highest temperature which is attained in service under the most adverse operating conditions within the rating of the electrical apparatus by any part or surface of the apparatus which could produce an ignition of the surrounding explosive atmosphere

NOTE The most adverse conditions include recognized overloads and fault conditions recognized in the specific standard for the type of protection concerned.

3.5

group (of an electrical apparatus for explosive atmospheres)

classification of electrical apparatus related to the explosive atmosphere for which it is to be used

NOTE Electrical apparatus for use in explosive gas atmospheres is divided into two groups:

- group I: electrical apparatus for mines susceptible to firedamp;
- group II: (which can be divided into subgroups): electrical apparatus for places with an explosive gas atmosphere, other than mines susceptible to firedamp (see 5.4).

3.6

type of protection

specific measures applied to electrical apparatus to avoid ignition of a surrounding explosive atmosphere by such apparatus

3.7

sealing ring

ring used in a cable or conduit entry device to ensure sealing between the entry and the cable or conduit

3.8

maximum r.m.s. a.c. or d.c. voltage (U_m)

maximum voltage that can be applied to the non-intrinsically safe connection facilities of associated apparatus without invalidating intrinsic safety

3.9

maximum input voltage (U_i)

maximum voltage (peak a.c. or d.c.) that can be applied to the connection facilities for intrinsically safe circuits without invalidating intrinsic safety

¹⁾ At present at the stage of final draft international standard.

3.10**maximum output voltage (U_o)**

maximum output voltage (peak a.c. or d.c.) in an intrinsically safe circuit that can appear under open-circuit conditions at the connection facilities of the apparatus at any applied voltage up to the maximum voltage, including U_m and U_i

NOTE Where there is more than one applied voltage, the maximum output voltage is that occurring under the most onerous combination of applied voltages.

3.11**maximum input current (I_i)**

maximum current (peak a.c. or d.c.) that can be applied to the connection facilities for intrinsically safe circuits without invalidating intrinsic safety

3.12**maximum output current (I_o)**

maximum current (peak a.c. or d.c.) in an intrinsically safe circuit that can be taken from the connection facilities of the apparatus

3.13**maximum input power (P_i)**

maximum input power in an intrinsically safe circuit that can be dissipated within an apparatus when it is connected to an external source without invalidating intrinsic safety

3.14**maximum output power (P_o)**

maximum electrical power in an intrinsically safe circuit that can be taken from the apparatus

3.15**maximum internal capacitance (C_i)**

total equivalent internal capacitance of the apparatus which is considered as appearing across the connection facilities of the apparatus

3.16**maximum external capacitance (C_o)**

maximum capacitance in an intrinsically safe circuit that can be connected to the connection facilities of the apparatus without invalidating intrinsic safety

3.17**maximum internal inductance (L_i)**

total equivalent internal inductance of the apparatus which is considered as appearing at the connection facilities of the apparatus

3.18**maximum external inductance (L_o)**

maximum value of inductance in an intrinsically safe circuit that can be connected to the connection facilities of the apparatus without invalidating intrinsic safety

3.19**maximum internal inductance to resistance ratio (L_i/R_i)**

ratio of inductance (L_i) to resistance (R_i) which is considered as appearing at the external connection facilities of the electrical apparatus

3.20**maximum external inductance to resistance ratio (L_o/R_o)**

ratio of inductance (L_o) to resistance (R_o) of any external circuit connected to the connection facilities of the electrical apparatus without invalidating intrinsic safety

3.21**simple apparatus**

electrical component or combination of components of simple construction with well-defined electrical parameters which is compatible with the intrinsic safety of the circuit in which it is used. The following apparatus is considered to be simple apparatus:

- a) passive components, for example switches, junction boxes, resistors and simple semi-conductor devices;
- b) sources of stored energy with well-defined parameters, for example capacitors or inductors, whose values are considered when determining the overall safety of the system;
- c) sources of generated energy, for example thermocouples and photocells, which do not generate more than 1,5 V, 100 mA and 25 mW. Any inductance or capacitance present in these sources of energy are considered as in b).

3.22**intrinsically safe apparatus**

electrical apparatus in which all the circuits are intrinsically safe

3.23**associated apparatus**

electrical apparatus in which the circuits or parts of circuits are not all necessarily intrinsically safe but which contains circuits that can affect the safety of the intrinsically safe circuits associated with it

3.24**normal operation**

operation of apparatus conforming electrically and mechanically with its design specification and used within the limits specified by the manufacturer

NOTE The limits specified by the manufacturer may include persistent operational conditions such as stalled rotors, failed lamps and overloads.