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SIST EN 60079-10:2003

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EUROPEAN STANDARD

**EN 60079-10**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2003

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Supersedes EN 60079-10:1996

English version

**Electrical apparatus for explosive gas atmospheres**  
**Part 10: Classification of hazardous areas**  
(IEC 60079-10:2002)

Matériel électrique pour atmosphères  
explosives gazeuses  
Partie 10: Classement des emplacements  
dangereux  
(CEI 60079-10:2002)

Elektrische Betriebsmittel für  
gasexplosionsgefährdete Bereiche  
Teil 10: Einteilung der  
explosionsgefährdeten Bereiche  
(IEC 60079-10:2002)

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This European Standard was approved by CENELEC on 2002-12-01. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

**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 the International Standard IEC 60079-10:2002, prepared by SC 31J, Classification of hazardous areas and installation requirements, of IEC TC 31, Electrical apparatus for explosive atmospheres, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60079-10 on 2002-12-01 without any modification.

This European Standard supersedes EN 60079-10:1996.

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) 2003-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-12-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

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

Annex ZA has been added by CENELEC.

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### Endorsement notice

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The text of the International Standard IEC 60079-10:2002 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**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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 60050-426	1990	International Electrotechnical Vocabulary (IEV) Chapter 426: Electrical apparatus for explosive atmospheres	-	-
IEC 60079-4	1975	Electrical apparatus for explosive gas atmospheres Part 4: Method of test for ignition temperature	-	-
IEC 60079-4A	1970	Part 4: Method of test for ignition temperature – First supplement	-	-
IEC 60079-20	1996	Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus	-	-

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Electrical apparatus for explosive gas atmospheres –  
Part 10: Classification of hazardous areas**

**Matériel électrique pour atmosphères explosives gazeuses –  
Partie 10: Classement des emplacements dangereux**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

**XA**

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	4
1 General.....	5
1.1 Scope.....	5
1.2 Normative references.....	6
2 Definitions and terms.....	6
3 Safety and area classification.....	10
3.1 Safety principles.....	10
3.2 Area classification objectives.....	10
4 Area classification procedure.....	11
4.1 General.....	11
4.2 Sources of release.....	12
4.3 Type of zone.....	12
4.4 Extent of zone.....	13
4.4.1 Release rate of gas or vapour.....	13
4.4.2 Lower explosive limit ( <i>LEL</i> ).....	14
4.4.3 Ventilation.....	14
4.4.4 Relative density of the gas or vapour when it is released.....	14
4.4.5 Other parameters to be considered.....	15
4.4.6 Illustrative examples.....	15
5 Ventilation.....	16
5.1 General.....	16
5.2 Main types of ventilation.....	16
5.3 Degree of ventilation.....	16
5.4 Availability of ventilation.....	16
6 Documentation.....	17
6.1 General.....	17
6.2 Drawings, data sheets and tables.....	17
Annex A (informative) Examples of sources of release.....	18
Annex B (informative) Ventilation.....	20
Annex C (informative) Examples of hazardous area classification.....	36
Figure C.1 – Preferred symbols for hazardous area zones.....	57
Figure C.2 – Schematic approach to the classification of hazardous areas.....	58



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –****Part 10: Classification of hazardous areas**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60079-10 has been prepared by subcommittee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Electrical apparatus for explosive atmospheres.

This fourth edition cancels and replaces the third edition published in 1995, and constitutes a technical revision.

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

FDIS	Report on voting
31J/82/FDIS	31J/84/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 3.

Annexes A, B and C are for information only.

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.

## INTRODUCTION

In areas where dangerous quantities and concentrations of flammable gas or vapour may arise, protective measures are to be applied in order to reduce the risk of explosions. This part of IEC 60079 sets out the essential criteria against which the risk of ignition can be assessed, and gives guidance on the design and control parameters which can be used in order to reduce such a risk.

This standard can be used as a basis for the proper selection and installation of apparatus for use in a hazardous area.

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SIST EN 60079-10:2003

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# ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –

## Part 10: Classification of hazardous areas

### 1 General

#### 1.1 Scope

This part of IEC 60079 is concerned with the classification of hazardous areas where flammable gas or vapour risks may arise, in order to permit the proper selection and installation of apparatus for use in such hazardous areas.

It is intended to be applied where there may be a risk of ignition due to the presence of flammable gas or vapour, mixed with air under normal atmospheric conditions (see note 2), but it does not apply to

- a) mines susceptible to firedamp;
- b) the processing and manufacture of explosives;
- c) areas where a risk may arise due to the presence of ignitable dusts or fibres;
- d) catastrophic failures which are beyond the concept of abnormality dealt with in this standard (see note 3);
- e) rooms used for medical purposes;
- f) areas where the presence of flammable mist may give rise to an unpredictable risk and which require special consideration (see note 5);
- g) domestic premises.

This standard does not take into account the effects of consequential damage.

Definitions and explanations of terms are given together with the main principles and procedures relating to hazardous area classification.

For detailed recommendations regarding the extent of the hazardous areas in specific industries or applications, reference may be made to the codes relating to those industries or applications.

NOTE 1 For the purpose of this standard, an area is a three-dimensional region or space.

NOTE 2 Atmospheric conditions include variations above and below reference levels of 101,3 kPa (1 013 mbar) and 20 °C (293 K), provided that the variations have a negligible effect on the explosion properties of the flammable materials.

NOTE 3 Catastrophic failure in this context is applied, for example, to the rupture of a process vessel or pipeline and events that are not predictable.

NOTE 4 In any process plant, irrespective of size, there may be numerous sources of ignition apart from those associated with electrical apparatus. Appropriate precautions will be necessary to ensure safety in this context. This standard may be used with judgement for other ignition sources.

NOTE 5 Mists may form or be present at the same time as flammable vapours. This may affect the way flammable material disperses and the extent of any hazardous areas. The strict application of area classification for gases and vapours may not be appropriate because the flammability characteristics of mists are not always predictable. Whilst it can be difficult to decide upon the type and extent of zones, the criteria applicable to gases and vapours will, in most cases, give a safe result. However, special consideration should always be given to the danger of ignition of flammable mists.

## 1.2 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 60050(426):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 426: Electrical apparatus for explosive atmospheres*

IEC 60079-4:1975, *Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature*

IEC 60079-4A:1970, *First supplement to IEC 60079-4 (1966), Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature*

IEC 60079-20:1996, *Electrical apparatus for explosive gas atmospheres – Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus*

## 2 Definitions and terms

For the purpose of this part of IEC 60079, the following definitions and terms apply.

NOTE Where a definition appears in this clause and in IEC 60050(426), the definition given in this clause is applicable.

### 2.1

#### **explosive atmosphere**

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

[IEV 426-02-02, modified]

### 2.2

#### **explosive gas atmosphere**

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

[IEV 426-02-03, modified]

NOTE Although a mixture which has a concentration above the upper explosive limit (UEL) is not an explosive gas atmosphere, it can readily become so and, in certain cases for area classification purposes, it is advisable to consider it as an explosive gas atmosphere.

### 2.3

#### **hazardous area**

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

[IEV 426-03-01, modified]

### 2.4

#### **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 apparatus

[IEV 426-03-02, modified]

## 2.5

### zones

hazardous areas are classified into zones based upon the frequency of the occurrence and duration of an explosive gas atmosphere, as follows:

#### 2.5.1

##### zone 0

place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently

[IEV 426-03-03, modified]

#### 2.5.2

##### zone 1

place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally

[IEV 426-03-04, modified]

#### 2.5.3

##### zone 2

place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only

[IEV 426-03-05, modified]

NOTE 1 In this definition, the word "persist" means the total time for which the flammable atmosphere will exist. This will normally comprise the total of the duration of the release, plus the time taken for the flammable atmosphere to disperse after the release has stopped. (The term "persistence time" as used in annex B refers specifically to only one part of the total time for which the flammable atmosphere will exist.)

NOTE 2 Indications of the frequency of the occurrence and duration may be taken from codes relating to specific industries or applications.

## 2.6

### source of release

point or location from which a flammable gas, vapour, or liquid may be released into the atmosphere in such a way that an explosive gas atmosphere could be formed

[IEV 426-03-06, modified]

## 2.7

### grades of release

there are three basic grades of release, as listed below in order of decreasing frequency and likelihood of the explosive gas atmosphere being present:

- a) continuous grade;
- b) primary grade;
- c) secondary grade.

A source of release may give rise to any one of these grades of release, or to a combination of more than one

#### 2.7.1

##### continuous grade of release

release which is continuous or is expected to occur frequently or for long periods

### 2.7.2

#### **primary grade of release**

release which can be expected to occur periodically or occasionally during normal operation

### 2.7.3

#### **secondary grade of release**

release which is not expected to occur in normal operation and, if it does occur, is likely to do so only infrequently and for short periods

### 2.8

#### **release rate**

quantity of flammable gas or vapour emitted per unit time from the source of release

### 2.9

#### **normal operation**

situation when the equipment is operating within its design parameters

NOTE 1 Minor releases of flammable material may be part of normal operation. For example, releases from seals which rely on wetting by the fluid which is being pumped are considered to be minor releases.

NOTE 2 Failures (such as the breakdown of pump seals, flange gaskets or spillages caused by accidents) which involve urgent repair or shut-down are not considered to be part of normal operation nor are they considered to be catastrophic.

NOTE 3 Normal operation includes start-up and shut-down conditions.

### 2.10

#### **ventilation**

movement of air and its replacement with fresh air due to the effects of wind, temperature gradients, or artificial means (for example, fans or extractors)

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### 2.11

#### **explosive limits**

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NOTE The terms "explosive limit" and "flammable limit" are equivalent. IEC 60079-20 and IEC 61779-1 use the term "flammable limit" whilst all the other standards use the more widely accepted term "explosive limit".

#### 2.11.1

##### **lower explosive limit (LEL)**

concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive

[IEV 426-02-09, modified]

#### 2.11.2

##### **upper explosive limit (UEL)**

concentration of flammable gas or vapour in air, above which the gas atmosphere is not explosive

[IEV 426-02-10, modified]

### 2.12

#### **relative density of a gas or a vapour**

density of a gas or a vapour relative to the density of air at the same pressure and at the same temperature (air is equal to 1,0)

**2.13****flammable material (flammable substance)**

material which is flammable of itself, or is capable of producing a flammable gas, vapour or mist

**2.14****flammable liquid**

liquid capable of producing a flammable vapour under any foreseeable operating conditions

**2.15****flammable gas or vapour**

gas or vapour which, when mixed with air in certain proportions, will form an explosive gas atmosphere

**2.16****flammable mist**

droplets of flammable liquid, dispersed in air so as to form an explosive atmosphere

**2.17****flashpoint**

lowest liquid temperature at which, under certain standardized conditions, a liquid gives off vapours in a quantity such as to be capable of forming an ignitable vapour/air mixture

[IEV 426-02-14]

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**2.18****boiling point**

temperature of a liquid boiling at an ambient pressure of 101,3 kPa (1 013 mbar)

NOTE The initial boiling point that should be used for liquid mixtures is to indicate the lowest value of the boiling point for the range of liquids present, as determined in a standard laboratory distillation without fractionation.

**2.19****vapour pressure**

pressure exerted when a solid or liquid is in equilibrium with its own vapour. It is a function of the substance and of the temperature

**2.20****ignition temperature of an explosive gas atmosphere**

lowest temperature of a heated surface at which, under specified conditions, the ignition of a flammable substance in the form of a gas or vapour mixture with air will occur

[IEV 426-02-01, modified]

NOTE IEC 60079-4 and IEC 60079-4A standardize a method for the determination of this temperature.

**2.21****extent of zone**

distance in any direction from the source of release to the point where the gas/air mixture has been diluted by air to a value below the lower explosive limit

**2.22****liquefied flammable gas**

flammable material which is stored or handled as a liquid and which at ambient temperature and atmospheric pressure is a flammable gas