SLOVENSKI STANDARD
SIST EN 60079-10:1997

01-avgust-1997

Električne naprave za eksplozivne plinske atmosfere - 10. del: Razdelitev eksplozijsko ogroženih območij (IEC 60079-10:1995)

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

Elektrische Betriebsmittel für gasexplosionsgefährdete Bereiche -- Teil 10: Einteilung der explosionsgefährdeten Bereiche

Matériel électrique pour atmosphères explosives gazeuses -- Partie 10: Classement des régions dangereuses

Ta slovenski standard je istoveten z: **EN 60079-10:1996**

ICS:

29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres

SIST EN 60079-10:1997 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60079-10

January 1996

ICS 29.260.20

Descriptors: Electric equipment, explosive atmospheres, flammable gases, definitions, hazards, regions, filing, safety, explosion proofing, ventilation

English version

Electrical apparatus for explosive gas atmospheres Part 10: Classification of hazardous areas (IEC 79-10:1995)

Matériel électrique pour atmosphères explosives gazeuses
Partie 10: Classement des régions dangereuses
(CEI 79-10:1995)

Elektrische Betriebsmittel für gasexplosionsgefährdete Bereiche
Teil 10: Einteilung der explosionsgefährdeten Bereiche
(IEC 79-10:1995)

This European Standard was approved by CENELEC on 1995-11-28. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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 document 31J/39/FDIS, future edition 3 of IEC 79-10, 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 60079-10 on 1995-11-28.

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) 1996-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-09-01

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.

Endorsement notice

The text of the International Standard IEC 79-10:1995 was approved by CENELEC as a European Standard without any modification.

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.

Publication	Year	Title	EN/HD	Year
IEC 50(426)	1990	International Electrotechnical Vocabulary (IEV) Chapter 426: Electrical apparatus for explosive atmospheres	-	-
IEC 79-4	1975	Electrical apparatus for explosive gas atmospheres Part 4: Method of test for ignition temperature	-	-
IEC 79-4A	1970	First supplement to IEC 79-4 (1966)	-	-

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
79-10

Troisième éditio
Third editio
1995-1

Matériel électrique pour atmosphères explosives gazeuses

Partie 10:
Classement des régions dangereuses

Electrical apparatus for explosive gas atmospheres

Part 10:
Classification of hazardous areas

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembé Genève, Suiss

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE XA

Pour prix, voir catalogue en vigue
For price, see current catalogue

CONTENTS

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, prepared by technical committees on which all the National Committees having a special interest therein are represented, express as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use published in the form of standards, 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.

International Standard IEC 79-10 has been prepared by sub-committee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Electrical apparatus for explosive atmospheres.

This third edition cancels and replaces the second edition published in 1986, and constitutes a technical revision.

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

FDIS	Report on voting
31J/39/FDIS	31J/45/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.

Annexes A, B and C are for information only.

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. The objective of this part of IEC 79 is to set out the essential criteria against which the risk of ignition can be assessed, and to give guidance on the design and control parameters which can be used in order to reduce this risk.

In the case of electrical apparatus, this standard is used as a basis for the proper selection and installation of apparatus for use in a hazardous area. Reference should be made to the appropriate standard(s) for details.

ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –

Part 10: Classification of hazardous areas

1 General

1.1 *Scope*

This part of IEC 79 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 (see notes 1 and 4).

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).

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.

NOTES

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

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.

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

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.

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

IEC 79-4: 1975, *Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature*

IEC 79-4A: 1970, *First supplement to IEC 79-4 (1966)*

2 Definitions and terms

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

2.1 **explosive gas atmosphere:** A mixture with air, under atmospheric conditions, of a flammable material 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.

2.2 **hazardous area:** An 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]

2.3 **non-hazardous area:** An 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]

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

2.4.1 **zone 0:** An area in which an explosive gas atmosphere is present continuously or for long periods. [IEV 426-03-03, modified]

2.4.2 **zone 1:** An area in which an explosive gas atmosphere is likely to occur in normal operation. [IEV 426-03-04]

2.4.3 **zone 2:** An area in which an explosive gas atmosphere is not likely to occur in normal operation and, if it does occur, is likely to do so only infrequently and will exist for a short period only. [IEV 426-03-05, modified]

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

2.5 **source of release:** A point or location from which a flammable gas, vapour, or liquid may be released into the atmosphere such that an explosive gas atmosphere could be formed. [IEV 426-03-06, modified]

2.6 **grades of release:** There are three basic grades of release, as listed below in order of decreasing 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.

2.6.1 **continuous grade of release:** A release which is continuous or is expected to occur for long periods.

2.6.2 **primary grade of release:** A release which can be expected to occur periodically or occasionally during normal operation.

2.6.3 **secondary grade of release:** A 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.

2.7 **release rate:** The quantity of flammable gas or vapour emitted per unit time from the source of release.

2.8 **normal operation:** The situation when the equipment is operating within its design parameters.

NOTES

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.

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.

2.9 **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).

2.10 **explosive limits**

2.10.1 **lower explosive limit (LEL):** The concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive. [IEV 426-02-09, modified]

2.10.2 **upper explosive limit (UEL):** The concentration of flammable gas or vapour in air, above which the gas atmosphere is not explosive. [IEV 426-02-10, modified]

NOTE – For the purpose of this standard, the terms "explosive" and "flammable" should be considered synonymous.

2.11 relative density of a gas or a vapour: The 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).

2.12 flammable material: A material which is flammable of itself, or is capable of producing a flammable gas, vapour or mist.

2.13 flammable liquid: A liquid capable of producing a flammable vapour under any foreseeable operating conditions.

2.14 flammable gas or vapour: Gas or vapour which, when mixed with air in certain proportions, will form an explosive gas atmosphere.

2.15 flammable mist: Droplets of flammable liquid, dispersed in air so as to form an explosive atmosphere.

2.16 flashpoint: The 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]

2.17 boiling point: The temperature of a liquid boiling at an ambient pressure of 101,3 kPa (1 013 mbar).

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

2.18 vapour pressure: The 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.

2.19 ignition temperature of an explosive gas atmosphere: The 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.

NOTE – IEC 79-4 and IEC 79-4A standardize a method for the determination of this temperature. [IEV 426-02-01, modified]

3 Safety and area classification

3.1 *Safety principles*

Installations in which flammable materials are handled or stored should be designed, operated and maintained so that any releases of flammable material, and consequently the extent of hazardous areas, are kept to a minimum, whether in normal operation or otherwise, with regard to frequency, duration and quantity.

In the case of maintenance activities other than those of normal operation, the extent of the zone may be affected but it is expected that this would be dealt with by a permit-to-work system.

In emergency situations, reliance should be placed on the isolation of unsuitable electrical equipment, shut-down of the process, isolation of process vessels, containment of spillages and, if possible, the provision of additional emergency ventilation.

In a situation in which there may be an explosive gas atmosphere, the following steps should be taken:

a) eliminate the likelihood of an explosive gas atmosphere occurring around the source of ignition, or

b) eliminate the source of ignition.

Where this is not possible, protective measures, process equipment, systems and procedures should be selected and prepared so the likelihood of the coincidence of a) and b) is so small as to be acceptable. Such measures may be used singly if they are recognized as being highly reliable, or in combination to achieve an equivalent level of safety.

3.2 *Area classification objectives*

Area classification is a method of analysing and classifying the environment where explosive gas atmospheres may occur so as to facilitate the proper selection and installation of apparatus to be used safely in that environment, taking into account gas groups and temperature classes.

In most practical situations where flammable materials are used, it is difficult to ensure that an explosive gas atmosphere will never occur. It may also be difficult to ensure that apparatus will never give rise to a source of ignition. Therefore, in situations where an explosive gas atmosphere has a high likelihood of occurring, reliance is placed on using apparatus which has a low likelihood of creating a source of ignition. Conversely, where the likelihood of an explosive gas atmosphere occurring is reduced, apparatus constructed to a less rigorous standard may be used.

It is rarely possible by a simple examination of a plant or plant design to decide which parts of the plant can be equated to the three zonal definitions (zones 0, 1 and 2). A more detailed approach is therefore necessary and this involves the analysis of the basic possibility of an explosive gas atmosphere occurring.

The first step is to assess the likelihood of this, in accordance with the definitions of zone 0, zone 1 and zone 2. Once the likely frequency and duration of release (and hence the grade of release), the release rate, concentration, velocity, ventilation and other factors which affect the type and/or extent of the zone have been determined, there is then a firm basis on which to determine the likely presence of an explosive gas atmosphere in the surrounding areas. This approach therefore requires detailed consideration to be given to each item of process equipment which contains a flammable material, and which could therefore be a source of release.

In particular, zone 0 or zone 1 areas should be minimized in number and extent by design or suitable operating procedures. In other words, plants and installations should be mainly zone 2 or non-hazardous. Where release of flammable material is unavoidable, process equipment items should be limited to those which give secondary grade releases or, failing this (that is where primary or continuous grade releases are unavoidable), the releases should be of very limited quantity and rate. In carrying out area classification, these principles should receive