
Električne naprave za potencialno eksplozivne atmosfere - Vrsta zaščite “n”

Electrical apparatus for potentially explosive atmospheres - Type of protection n

Elektrische Betriebsmittel für explosionsgefährdete Bereiche - Zündschutzart n

Matériel électrique pour atmosphères explosibles - Mode de protection type n

Ta slovenski standard je istoveten z: EN 50021:1999

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50021

April 1999

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English version

**Electrical apparatus for potentially explosive atmospheres
Type of protection "n"**

Matériel électrique pour atmosphères
explosibles - Mode de protection
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explosionsgefährdete Bereiche
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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

Contents

	Page
Foreword	4
Section One: General	
1 Scope.....	5
2 Normative references	5
3 Definitions	7
4 General requirements	14
Section Two: Requirements for all electrical apparatus	
5 General.....	19
6 Construction.....	20
7 Connection facilities and wiring	22
8 Clearances, creepage distances and separations	25
9 Electric strength	34
Section Three: Supplementary requirements for non-sparking apparatus	
10 Rotating machines.....	35
11 Fuses and fuse assemblies.....	40
12 Luminaires	41
13 Instruments and low power apparatus.....	48
14 Current transformers	49
15 Plugs and sockets	49
16 Cells and batteries	49

Section Four: Supplementary requirements for apparatus producing arcs, sparks or hot surfaces

17	General.....	57
18	Enclosed-break devices and non-incendive components.....	57
19	Hermetically-sealed device.....	59
20	Sealed device or encapsulated device.....	59
21	Energy-limited apparatus and circuits.....	59
22	Restricted-breathing enclosures.....	61
23	Simplified pressurization.....	62

Section Five: Verification and testing

24	General.....	63
25	Documents.....	63
26	Type tests.....	63
27	Routine verifications and tests.....	82

Section Six: Marking and documentation

28	Marking.....	84
29	Documentation.....	87
30	Manufacturer's responsibility.....	88

Annex A (normative)

Assessment of energy-limited apparatus and circuits by reference curves and tables....	89
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Page 4
EN 50021:1999

Foreword

This European Standard was prepared by SC 31-5, Apparatus type of protection “n”, of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50021 on 1998-08-01.

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) 1999-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-06-30

The European Standard was prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of the EC Directive 94/9/EC.

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

In this standard, annex A is normative.

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Section One: General

1 Scope

This European Standard specifies requirements for the construction, testing and marking for Group II electrical apparatus with type of protection 'n', intended for use only in areas where explosive atmospheres of gas, vapour and mist are unlikely to occur or if they do occur, are likely to do so infrequently or for a short period only.

This standard is applicable to non-sparking electrical apparatus and also to apparatus with parts or circuits producing arcs or sparks or having hot surfaces which, if not protected in one of the ways specified in this standard, could be capable of igniting a surrounding explosive atmosphere.

A non-incendive part is limited in use to the particular circuit for which it has been shown to be non-ignition capable and, therefore, cannot be separately assessed as complying with this standard.

This standard is applicable to electrical equipment and components of Group II, Category 3G. Such equipment is designed to be capable of functioning in conformity with the operating parameters established by the manufacturer and ensuring a normal level of protection.

Equipment in this category ensures the requisite level of protection during normal operation.

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NOTE 1: In this standard the word 'apparatus' has the same meaning as the word 'equipment' used in the Directive.

Compliance with this European Standard does not imply any removal of, or lowering of, the requirements of any other European Standard with which the electrical apparatus complies.

This standard supplements, and may supersede, the requirements for apparatus for normal industrial applications.

NOTE 2: The application of this standard may require the exercise of engineering judgement because of the wide range of apparatus and technologies covered. If apparatus is to be certified the relevant requirements may need to be agreed between the manufacturer and the testing station.

2 Normative references

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.

EN 50014	1997	Electrical apparatus for potentially explosive atmospheres General requirements
EN 50020	1994	Electrical apparatus for potentially explosive atmospheres Intrinsic safety 'i'

EN 60034-1		Rotating electrical machines Part 1: Rating and performance
EN 60034-5		Rotating electrical machines Part 5: Classification of degrees of protection provided by enclosures for rotating machines
EN 60068-2-27	1993	Basic environmental testing procedures - Part 2: Tests - Test Ea and guidance: Shock
EN 60068-2-75		Environmental testing - Part 2: Tests - Test Eh: Hammer tests
EN 60081		Double-capped fluorescent lamps - Performance specifications
EN 60155		Starters for tubular fluorescent lamps
EN 60238		Edison screw lampholders
EN 60269-3		Low-voltage fuses - Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)
EN 60400		Lampholders for tubular fluorescent lamps and starterholders
EN 60529	1991	Degrees of protection provided by enclosures (IP Code)
EN 60598-1	1997	Luminaires - Part 1: General requirements and tests
EN 60598-2		Luminaires - Part 2: Particular requirements luminaires
EN 60662		High-pressure sodium vapour lamps
EN 60920		Ballasts for tubular fluorescent lamps - General and safety requirements
EN 60922		Auxiliaries for lamps - Ballasts for discharge lamps (excluding tubular fluorescent lamps) - General and safety requirements
EN 60924		D.C. supplied electronic ballasts for tubular fluorescent lamps - General and safety requirements
EN 60926		Auxiliaries for lamps - Starting devices (other than glow starters) - General and safety requirements
EN 60927		Auxiliaries for lamps - Starting devices (other than glow starters) - Performance requirements
EN 60928		Auxiliaries for lamps - A.C. supplied electronic ballasts for tubular fluorescent lamps - General and safety requirements
EN 60947-1		Low-voltage switchgear and controlgear - Part 1: General rules
EN 61048		Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements
EN 61049		Capacitors for use in tubular fluorescent and other discharge lamp circuits - Performance requirements
EN 61184		Bayonet lampholders

International Publications with references to the corresponding European publications

IEC 60050	International Electrotechnical Vocabulary	
IEC 60060	High-voltage test techniques	HD 588 S1:1991 EN 60060-2:1994

IEC 60112	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions	HD 214 S2:1980
IEC 60216-1	Guide for the determination of thermal endurance properties of electrical insulating materials Part 1: General guidelines for ageing procedure and evaluation of test results	HD 611.1 S1:1992
IEC 60216-2	Guide for the determination of thermal endurance properties of electrical insulating materials Part 2: Choice of test criteria	HD 611.2 S1:1992
IEC 60664-1	Insulation co-ordination for equipment within low-voltage systems Part 1: Principles, requirements and tests	HD 625.1 S1:1996
ISO 179	Plastics - Determination of charpy impact strength	
ISO 4892	Plastics - Methods of exposure to laboratory light sources	

3 Definitions

For the purposes of this standard, the following definitions apply.

NOTE: Definitions which are identical with or technically equivalent to those given in IEC 60050, IEC 60664-1, and EN 50014 are identified as follows:

IEC 60050	¹⁾
IEC 60664-1	²⁾
EN 50014	³⁾

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3.1 electrical apparatus³⁾: Items applied as a whole or in part for the utilization of electrical energy. These include, among others, items for the generation, transmission, distribution, storage, measurement, regulation, conversion, and consumption of electrical energy and items for telecommunications.

3.2 explosive gas atmosphere³⁾: A 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.

3.3 type of protection³⁾: The specific measures applied to electrical apparatus to avoid ignition of a surrounding explosive atmosphere.

3.4 type of protection 'n': Type of protection applied to electrical apparatus such that, in normal operation and in certain abnormal conditions specified by this standard, it is not capable of igniting a surrounding explosive atmosphere.

NOTE 1: Additionally, the requirements of this standard are intended to ensure that a fault capable of causing ignition is not likely to occur.

NOTE 2: An example of a specified abnormal condition is a luminaire with failed lamp.

3.5 normal operation: The operation of apparatus conforming electrically and mechanically with its design specification and used within the limits specified by the manufacturer.

NOTE 1: The limits specified by the manufacturer may include persistent operational conditions, e.g. operation of a motor on a duty cycle.

NOTE 2: Variation of the supply voltage within stated limits (see 4.3.1.2) and any other operational tolerance is part of normal operation.

3.6 enclosure³⁾: All the walls doors, covers, cable entries, rods, spindles, shafts, etc. which contribute to the type of protection and/or the degree of protection (IP) of the electrical apparatus.

3.7 degree of protection of enclosure (IP)³⁾: A numerical classification preceded by the symbol 'IP' applied to the enclosure of electrical apparatus to provide for:

- protection of persons against contact with or approach to live parts and against contact with moving parts (other than smooth rotating shafts and the like) inside the enclosure, and
- protection of the electrical apparatus against ingress of solid foreign objects and, where indicated by the classification,
- protection of the electrical apparatus against harmful ingress of water.

NOTE: The enclosure which provides the degree of protection IP' is not necessarily identical to the apparatus enclosure for the types of protection listed in 1.2 of EN 50014:1997.

3.8 non-sparking device: A device constructed to minimize the risk of occurrence of arcs, sparks or hot spots capable of creating an ignition hazard during normal use. Normal use excludes the removal or insertion of components with the circuit energized.

3.9 enclosed-break device: Device incorporating electrical contacts that are made and broken and that will withstand an internal explosion of the flammable gas or vapour which may enter it without suffering damage and without communicating the internal explosion to the external flammable gas or vapour.

3.10 non-incendive component: Component with contacts for making and breaking a potentially-incendive circuit where either the contacting mechanism or the enclosure in which the contacts are housed is so constructed that ignition of the prescribed flammable gas or vapour is prevented under specified operating conditions.

3.11 hermetically-sealed device: Device which is so constructed that the external atmosphere cannot gain access to the interior and in which the seal is made by fusion, e.g. by soldering, brazing, welding or the fusion of glass to metal.

3.12 sealed device: Device which is so constructed that it cannot be opened during normal service and is sealed effectively to prevent entry of an external atmosphere.

3.13 encapsulated device: Device, which may or may not contain voids, which is so constructed that it is totally immersed in an encapsulating compound so that it is sealed to prevent entry of an external atmosphere.

3.14 restricted-breathing enclosure: Enclosure that is designed to restrict the entry of gases.

3.15 simplified pressurisation: The technique of applying a protective gas to an enclosure in order to prevent the formation of an explosive atmosphere inside the enclosure by maintaining an overpressure against the surrounding atmosphere.

3.16 maximum surface temperature: The highest temperature which is attained in service under the most adverse conditions (but within the recognized tolerances) by any part or surface of an electrical apparatus, which would be able to produce an ignition of the surrounding explosive atmosphere.

NOTE 1: The manufacturer will prescribe the product standard and also in his particular design he should take into account the following other conditions:

- fault conditions specified in this standard for the protection technique concerned;
- all operating conditions in any other standard specified by him, including recognized overloads;
- any other operating condition specified by him.

NOTE 2: The relevant surface temperature may be internal or external depending upon the protection technique concerned.

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3.17 energy limitation: Concept applicable to circuits in which no spark or any thermal effect produced in the test conditions prescribed in this standard is capable of causing ignition of a given flammable gas or vapour.

3.17.1 energy-limited apparatus: Electrical apparatus in which the circuits and components are constructed according to the concept of energy limitation.

3.17.2 associated energy-limited apparatus: Electrical apparatus which contains both energy-limited and non-energy-limited circuits and is constructed so that the non-energy-limited cannot adversely affect the energy-limited circuits. Associated energy-limited apparatus may be either:

- a) electrical apparatus which has an alternative type of protection listed in this standard for use in the appropriate explosive gas atmosphere;
- b) electrical apparatus which has an alternative type of protection listed in EN 50014 for use in the appropriate explosive gas atmosphere;
- c) electrical apparatus not so protected and which therefore shall not be used within an explosive gas atmosphere, e.g. a recorder which is not of itself in an explosive atmosphere but is connected to a thermocouple situated within an explosive atmosphere where only the recorder input circuit is energy-limited.

3.17.3 self protected energy-limited apparatus: Apparatus which contains energy-limited sparking contacts, the circuit (including energy-limited components or devices) supplying energy-limited power to these contacts, as well as the non-energy limited source of supply to the circuit.

3.18 explosive test mixture³⁾: A specified explosive mixture used for the testing of electrical apparatus for potentially explosive atmospheres.

3.19 terminal compartment³⁾: A separate compartment or part of a main enclosure, communicating or not with the main enclosure, and containing connection facilities.

3.20 connection facilities³⁾: Terminals, screws and other parts, used for the electrical connection of conductors of external circuits.

3.21 cable entry³⁾: A device permitting the introduction of one or more electric and/or fibre optic cables into an electrical apparatus so as to maintain the relevant type of protection.

3.22 conduit entry³⁾: A means of introducing a conduit into an electrical apparatus so as to maintain the relevant type of protection.

3.23 stopping box: A device to prevent the flow of a gas or a liquid between apparatus and a conduit by providing sealing facilities.

3.24 rated value³⁾: A quantity value assigned, generally by the manufacturer, for a specified operating condition of a component, device or apparatus.

3.25 rating³⁾: The set of rated values and operating conditions.

3.26 duty cycle¹⁾: Variation of load with time which may or may not be repeated and in which the cycle time is too short for thermal equilibrium to be attained.

3.27 creepage distance²⁾: Shortest distance along the surface of an insulating material between two conductive parts.

NOTE: A joint between two pieces of insulating material is considered part of the surface.

3.28 separation: Shortest distance through solid insulating material between two conductive parts.

3.29 clearance²⁾: Shortest distance in air between two conductive parts.

3.30 portable apparatus: Apparatus that can be moved while in operation or that can easily be moved from one place to another ready for use while connected to the supply.

3.31 working voltage²⁾: Highest r.m.s value of the a.c. or d.c. voltage which may occur (locally) across any insulation at rated supply volts, transients being disregarded, in open circuit conditions or under normal operating conditions.

3.32 Ex component: A part of electrical apparatus or a module (other than an Ex cable entry), marked with the symbol U, which is not intended to be used alone and requires additional consideration when incorporated into electrical apparatus or systems for use in potentially explosive atmospheres.

NOTE: Directive 94/9/EC defines a components as:

Any item essential to the safe functioning of equipment and protective systems but with no autonomous function.

In this standard, the words 'Ex component' have the same meaning as the word 'component used in the Directive'.

3.33 X symbol: The symbol used (usually as a suffix to a certificate reference) to denote special conditions for safe use.

3.34 U symbol: The symbol used (usually as a suffix to a certificate reference) to denote an Ex component.

NOTE: The symbols X and U should not be used together.

3.35 maximum input voltage (U_i): Maximum voltage (peak a.c. or d.c.) that can be safely applied in normal operation to the connection facilities of an energy-limited apparatus.

3.36 maximum output voltage (U_o): Maximum voltage (peak a.c. or d.c.) that can appear in normal operation, including open circuit conditions, at the connection facilities of an apparatus connected to an energy-limited circuit.

3.37 maximum r.m.s. a.c. or d.c. voltage (U_m): Maximum voltage that can be applied to the non-energy-limited connection facilities of associated energy-limited apparatus without invalidating the energy limitation.

3.38 maximum input current (I_i): Maximum current (peak a.c. or d.c.) that can be safely applied in normal operation to the connection facilities of an energy-limited apparatus.

3.39 maximum output current (I_o): Maximum current (peak a.c. or d.c.) that can be taken in normal operation, including short circuit at the terminals, from the connection facilities of an apparatus connected to an energy-limited circuit.

3.40 maximum input power (P_i): Maximum power that can be safely dissipated in normal operation within an energy-limited apparatus.

3.41 maximum output power (P_o): Maximum power that can be taken in normal operation from the connection facilities of an apparatus connected to an energy-limited circuit.

3.42 maximum external capacitance (C_o): Maximum capacitance in an energy-limited circuit that can be connected to the connection facilities of the apparatus.

3.43 maximum internal capacitance (C_i): Total equivalent internal capacitance of the apparatus containing energy-limited circuits which is considered as appearing across the connection facilities of the apparatus in normal operation.

3.44 maximum external inductance (L_o): Maximum value of inductance in an energy-limited circuit that can be connected to the connection facilities of the apparatus.

3.45 maximum internal inductance (L_i): Total equivalent internal inductance of the apparatus containing energy-limited circuits which is considered as appearing at the connection facilities of the apparatus in normal operation.

3.46 cell or battery¹⁾: An electrochemical system capable of storing in chemical form the electric energy received and which can give it back by reversion.

3.46.1 secondary cell: An assembly of electrodes and electrolyte which constitutes the basic unit of a secondary battery.

NOTE 1: A cell consists substantially of positive and negative plates and separators, of the items needed for assembling and connecting (plate lugs, group bars, terminal posts), of the cell container, and the electrolyte.

NOTE 2: A sketch illustrating various parts of a cell is given in figure 1. This sketch is included for descriptive purposes only and is not intended to imply any requirements or preference for a particular form of construction.

3.46.2 secondary battery¹⁾: Two or more secondary cells connected together and used as a source of electric energy.

3.46.3 container (of a cell)¹⁾: A container for the plate pack and electrolyte of a cell made of a material impervious to attack by the electrolyte.

3.46.4 (battery) container: Enclosure to contain the battery.

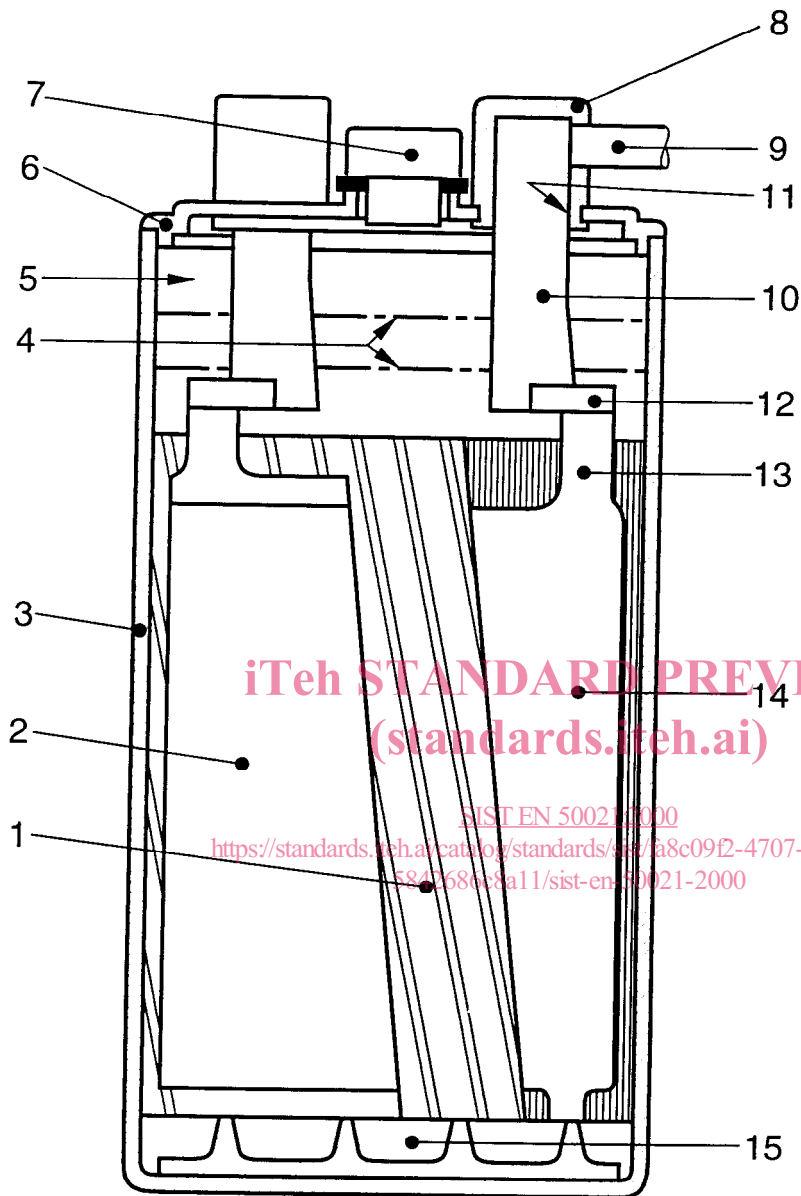
NOTE: The cover is a part of the battery container.

3.46.5 battery capacity¹⁾: The quantity of electricity or electric charge, which a fully charged battery can deliver under specified conditions.

NOTE: The SI unit for electrical charge is the coulomb ($1C = 1As$) but in practice, battery capacity is usually expressed in ampere-hours (Ah).

3.46.6 plate pack¹⁾: An assembly of the positive and negative plate groups with separators.

3.46.7 intercell connector¹⁾: A conductor of electricity used for carrying current between cells.



NOTE: This sketch is included for descriptive purposes only and is not intended to imply any requirements or preference for a particular form of construction.

- | | |
|-------------------------------|---|
| 1 Separator | 9 Intercell connector |
| 2 Positive plate | 10 Terminal post |
| 3 Cell container | 11 Electrolyte-tight terminal post seal |
| 4 Electrolyte level (max/min) | 12 Group bar |
| 5 Headspace | 13 Plate lug |
| 6 Electrolyte-tight lid seal | 14 Negative plate |
| 7 Filler and vent plug | 15 Slurry space |
| 8 Post encapsulation | |

Figure 1: Parts of a cell