



# SLOVENSKI STANDARD SIST EN 50014:2000

01-september-2000

Nadomešča:  
SIST EN 50014:1999

---

## Električne naprave za potencialno eksplozivne atmosfere - Splošne zahteve

Electrical apparatus for potentially explosive atmospheres - General requirements

Elektrische Betriebsmittel für explosionsgefährdete Bereiche - Allgemeine Bestimmungen

Matériel électrique pour atmosphères explosibles - Règles générales

Ta slovenski standard je istoveten z: **EN 50014:1997**

### ICS:

29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres
-----------	---	--

**SIST EN 50014:2000**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 50014:2000

<https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e46319bfd079/sist-en-50014-2000>

EUROPEAN STANDARD

**EN 50014**

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1997

ICS 29.260.20

Supersedes EN 50014:1992

Descriptors: Electrical apparatus, potentially explosive atmosphere, explosive atmosphere, explosion proofing, general requirement, oil immersion "o", pressurized apparatus "p", powder filling "q", flameproof enclosure "d", increased safety "e", intrinsic safety "i", encapsulation "m"

English version

## **Electrical apparatus for potentially explosive atmospheres General requirements**

Matériel électrique pour atmosphères  
explosibles - Règles générales

Elektrische Betriebsmittel für  
explosionsgefährdete Bereiche  
Allgemeine Bestimmungen

### **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[SIST EN 50014:2000](https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e46319bfd079/sist-en-50014-2000)

<https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e46319bfd079/sist-en-50014-2000>

This European Standard was approved by CENELEC on 1996-12-09. 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

This European Standard was prepared by the Technical Committee CENELEC TC31, Electrical apparatus for explosive atmospheres - General Requirements.

It consists of the text of EN 50014:1992 and an amendment to this second edition which was submitted to the unique acceptance procedure and approved by CENELEC on 1996-12-09 for inclusion into an "editorial" third edition of the standard.

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.

This European Standard is to be read in conjunction with the third editions of the European Standards for the specific types of protection listed in the scope of this standard. It does not apply in conjunction with the first or second editions of those standards and their amendments published before 1997.

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) 1997-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow)

STANDARD PREVIEW  
(standards.iteh.ai)

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

Annexes designated "informative" are given only for information.

In this standard, annexes B and C are normative; annexes A, D and E are informative.

SIST EN 50014:2000  
<https://standards.iteh.ai/catalog/standards/sist/41796886-15cc-4a95-889d-e46319bfd079/sist-en-50014-2000>

## CONTENTS

	Page
Foreword	2
List of Annexes	4
<b>GENERAL</b>	
1. Scope	5
2. Publications	6
3. Definitions and symbols	9
4. Apparatus grouping and temperature classification	13
5. Temperatures	14
<b>REQUIREMENTS FOR ALL ELECTRICAL APPARATUS</b>	
6. General	16
7. Non-metallic enclosures and non-metallic parts of enclosures	17
8. Enclosures containing light metals	20
9. Fasteners	20
10. Interlocking devices	22
11. Bushings	22
12. Materials used for cementing	22
13. Ex Components	23
14. Connection facilities and terminal compartments	23
15. Connection facilities for earthing or bonding conductors	24
16. Cable and conduit entries	25
<b>SUPPLEMENTARY REQUIREMENTS FOR CERTAIN ELECTRICAL APPARATUS</b>	
17. Rotating electrical machines	27
18. Switchgear	28
19. Fuses	29
20. Plugs and sockets	29
21. Luminaires	30
22. Caplights, Caplamps and Hand lamps	31
<b>VERIFICATIONS AND TESTS</b>	
23. Type verifications and tests	31
24. Routine verifications and tests	42
25. Manufacturer's responsibility	42
26. Verifications and tests on modified or repaired electrical apparatus	42
<b>MARKING</b>	
27. Marking	43
<b>INSTRUCTIONS</b>	
28. Instructions	48

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

SIST EN 50014:2000

<https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e465196bd079/sist-en-50014-2000>

		Page
ANNEX A (informative):	Subdivision of gases and vapours according to their maximum experimental safe gaps and minimum ignition currents.....	50
ANNEX B (normative):	Ex Cable entries.....	55
ANNEX C (normative):	Clauses with which Ex components shall comply.....	63
ANNEX D (informative):	Example of rig for resistance to impact test.....	66
ANNEX E (informative):	Methods of measurement of the insulation resistance of parts of enclosures of plastics materials.....	67

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 50014:2000](https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e46319bfd079/sist-en-50014-2000)

<https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e46319bfd079/sist-en-50014-2000>

## 1. SCOPE

1.1 This European Standard specifies the general requirements for construction, testing and marking of:

- electrical apparatus
- Ex cable entries
- Ex components

intended for use in potentially explosive atmospheres of gas, vapour and mist.

Potentially explosive atmospheres include the presence of combustible dusts.

Except where otherwise stated in the supplementary standards, this standard and the related standards provide protection in accordance with Category 2 or Category M2.

1.2 This European Standard is supplemented or modified by the following European Standards concerning the specific types of protection:

EN 50015:	Oil immersion 'o'
EN 50016:	Pressurization 'p'
EN 50017:	Powder filling 'q'
EN 50018:	Flameproof enclosure 'd'
EN 50019:	Increased safety 'e'
EN 50020:	Intrinsic safety 'i'
EN 50028:	Encapsulation 'm'
EN 50033:	Caplights for mines susceptible to firedamp

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 50014:2000  
<https://standards.iteh.ai/catalog/standards/sist/41796886-15ec-4a95-889d-e46319bfd079/sist-en-50014-2000>

EN 50039: Intrinsically safe electrical systems 'i'

- 1.3 The above European Standards and this European Standard are not applicable to the construction of electromedical apparatus, shot-firing exploders, test devices for exploders and for shot-firing circuits.

## 2. NORMATIVE REFERENCE

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 50015:	Electrical apparatus for potentially explosive atmospheres Oil immersion 'o'
EN 50016:	Electrical apparatus for potentially explosive atmospheres Pressurization 'p'
EN 50017:	Electrical apparatus for potentially explosive atmospheres Powder filling 'q'
EN 50018:	Electrical apparatus for potentially explosive atmospheres Flameproof enclosure 'd'
EN 50019:	Electrical apparatus for potentially explosive atmospheres Increased safety 'e'
EN 50020:	Electrical apparatus for potentially explosive atmospheres Intrinsic safety 'i'
EN 50028:	Electrical apparatus for potentially explosive atmospheres Encapsulation 'm'
EN 50033:	Electrical apparatus for potentially explosive atmospheres Caplights for mines susceptible to firedamp
EN 50039:	Electrical apparatus for potentially explosive atmospheres Intrinsically safe electrical systems 'i'



- EN 60034-5:1991 Rotating electrical machines.  
Part 5: Classification of degrees of protection provided by enclosures for rotating machines (Modified IEC 34-5 : 1981)
- EN 60529:1991 Degrees of protection provided by enclosures (IP Code) IEC 529: 1989
- EN 60662: 1993 High pressure sodium vapour lamps (Modified IEC 662: 1980 + A2: 1987 + A3: 1990)
- EN 60192: 1993 Low pressure sodium vapour lamps (IEC 192 : 1973 + Amdt 2: 1988 + Amdt 3: 1993)
- HD 611.1 S1: 1992 Guide for the determination of thermal endurance properties of electrical insulating materials  
  
Part 1: General guidelines for ageing and evaluation of test results (IEC 216-1: 1990)
- HD 611.2 S1: 1992 Guide for the determination of thermal endurance properties of electrical insulating materials  
**(standards.iteh.ai)**  
Part 2: List of materials and available tests. (IEC 216-2: 1990)
- IEC 79-1A :1975 First supplement to IEC 79-1 (1971)  
Electrical apparatus for explosive gas atmospheres -  
Part 1 : Construction and test of flameproof enclosures of electrical apparatus : Appendix D : Method of test for ascertainment of maximum experimental safe gap.
- IEC 79-4: 1975 Electrical apparatus for explosive gas atmospheres  
Part 4: Method of test for ignition temperature

ISO 48:1979	Vulcanized rubbers - Determination of hardness (Hardness between 30 and 85 IRHD)
ISO 178:1993	Plastics - Determination of flexural properties of rigid plastics
ISO 179:1993	Plastics - Determination of Charpy impact strength of rigid materials
ISO 262:1973	ISO general purpose metric screw threads - Selected sizes for screws, bolts and nuts
ISO 286-2:1988	ISO system of limits and fits - Part 2 Tables of standard tolerance grades and limit deviations for holes and shafts
ISO 527:1993	Plastics - Determination of tensile properties Part 2: Test conditions for moulding and extrusion plastics
ISO 965-1:1980	ISO general purpose metric screw threads - Tolerances - Part 1: Principles and basic data
ISO 965-2:1980	ISO general purpose metric screw threads - Tolerances - Part 2: Limits of sizes for general purpose bolt and nut threads - Medium quality
ISO 1817:1985	Rubber, vulcanised - Determination of the effect of liquids
ISO 1818:1975	Vulcanized rubbers of low hardness (10 to 35 IRHD) - Determination of hardness.
ISO 4014:1988	Hexagon head bolts - Product grades A and B
ISO 4017:1988:	Hexagon head screws - Product grades A and B
ISO 4026:1993	Hexagon socket set screws with flat point
ISO 4027:1993	Hexagon socket set screws with cone point
ISO 4028:1993	Hexagon socket set screws with dog point
ISO 4029:1993	Hexagon socket set screws with cup point
ISO 4032:1986	Hexagon nuts, style 1 - Product grades A and B
ISO 4762:1989	Hexagon socket head cap screws - Product grade A.
ISO 4892-1:1994	Plastics - Methods of exposure to laboratory light sources. Part 1: General guidance

iTech STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 50014:2000

<https://standards.iteh.ai/catalog/standards/sist/41790886-15cc-4a95-889d-c4651968d079/sist-en-50014-2000>

### 3 DEFINITIONS AND SYMBOLS

For the purpose of this European Standard and the European Standards listed in 1.2, the following definitions apply.

- 3.1 **electrical apparatus:** 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 **potentially explosive atmosphere:** An atmosphere which could become explosive (the danger is a potential one).
- 3.3 **explosive gas atmosphere:** 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.
- 3.4 **explosive test mixture:** A specified explosive mixture used for the testing of electrical apparatus for potentially explosive atmospheres.
- 3.5 **ignition temperature of an explosive gas atmosphere:** The lowest temperature of a heated surface at which, under specified conditions according to IEC 79-4, the ignition of a flammable substance in the form of a gas or vapour mixture with air will occur.
- 3.6 **service temperature:** The temperature reached when the apparatus is operating at its rating.
- 3.7 **maximum service temperature:** The highest value of the service temperatures.
- 3.8 **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 the standard for the types of protection concerned,
- all operating conditions specified 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 type of protection concerned.

- 3.9 **enclosure:** All the walls, doors, covers, cable entries, rods, spindles, shafts, etc., which contribute to the type of protection of and/or the degree of protection IP of the electrical apparatus.
- 3.10 **type of protection:** The specific measures applied to electrical apparatus to avoid ignition of a surrounding explosive atmosphere.
- 3.11 **degree of protection of enclosure IP:** A numerical classification according to EN 60529, 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 or liquids.
- Note: The enclosure that provides the degree of protection IP is not necessarily identical to the apparatus enclosure for the types of protection listed in 1.2.
- 3.12 **rated value:** A quantity value assigned, generally by the manufacturer, for a specified operating condition of a component, device or apparatus.
- 3.13 **rating:** The set of rated values and operating conditions.
- 3.14 **cable entry:** A device permitting the introduction of one or more electric and/or fibre optics cables into an electrical apparatus so as to maintain the relevant type of protection.
- 3.15 **Ex cable entry:** A cable entry tested separately from the apparatus enclosure but certified as an apparatus and which can be fitted to the apparatus enclosure during installation without further certification.
- 3.16 **conduit entry:** A means of introducing a conduit into an electrical apparatus so as to maintain the relevant type of protection.
- 3.17 **compression element:** An element of a cable entry acting on the sealing ring to enable the latter to fulfil its function.
- 3.18 **clamping device:** An element of a cable entry for preventing tension or torsion in the cable from being transmitted to the connections.
- 3.19 **sealing ring:** A ring used in a cable or conduit entry to ensure the sealing between the entry and the cable or conduit.
- 3.20 **terminal compartment:** A separate compartment or part of a main enclosure, communicating or not with the main enclosure, and containing connection facilities.
- 3.21 **connection facilities:** Terminals, screws and other parts, used for the electrical connection of conductors of external circuits.

- 3.22 **bushing:** An insulating device carrying one or more conductors through an internal or external wall of an enclosure.
- 3.23 **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 certification when incorporated into electrical apparatus or systems for use in potentially explosive atmospheres.
- 3.24 **"X" symbol:** The symbol used as a suffix to a certificate reference to denote special conditions for safe use.
- 3.25 **"U" symbol:** The symbol used as a suffix to a certificate reference to denote an Ex component.

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

### 3.26 **Equipment Group I Category M1**

Equipment designed, and, where necessary, equipped with additional special means of protection to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection.

Equipment in this category is intended for use in underground parts of mines as well as those parts of surface installations of such mines endangered by firedamp and/or combustible dust.

Equipment in this category is required to remain functional, even in the event of rare incidents relating to equipment with an explosive atmosphere present, and is characterized by means of protection such that:

- either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection; or
- the requisite level of protection is assured in the event of two faults occurring independently of each other.

### 3.27 **Equipment Group I Category M2**

Equipment designated to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a high level of protection.

Equipment in this category is intended for use in underground parts in mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust.

This equipment is intended to be de-energized in the event of an explosive atmosphere.

The means of protection relating to equipment in this category assure the requisite level of protection during normal operation and also in the case of more severe operating conditions, in particular those arising from rough handling and changing environmental conditions.

**3.28 Equipment Group II Category 1**

Equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dust mixtures are present continuously, for long periods or frequently.

Equipment in this category must ensure the requisite level of protection, even in the event of rare incidents relating to equipment, and is characterized by means or protection such that:

- either, in the event of failure of one means of protection, at least an independant second means provides the requisite level of protection; or
- the requisite level of protection is assured in the event of two faults occurring independently of each other.

**3.29 Equipment Group II Category 2**

Equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and of ensuring a high level of protection. Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur.

The means of protection relating to equipment in this category ensure the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account.

**3.30 Equipment Group II Category 3**

Equipment 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 is intended for use in areas in which explosive atmospheres caused by gases, vapour, mists, or air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

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

Note: In this standard the word "apparatus" has the same meaning as the word "equipment" used in the Directive.

**3.31 Component**

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

Note: In this standard the words "Ex component" have the same meaning as the word "component" used in the Directive.

## 4 APPARATUS GROUPING AND TEMPERATURE CLASSIFICATION

4.1 Electrical apparatus for potentially explosive atmospheres is divided into:

- Group I Electrical apparatus for mines susceptible to firedamp;
- Group II Electrical apparatus for places with a potentially explosive atmosphere, other than mines susceptible to firedamp.

Electrical apparatus intended for mines where the atmosphere, in addition to firedamp may contain significant proportions of other flammable gases (i.e other than methane), shall be constructed and tested in accordance with the requirements relating to Group I and also to the subdivision of Group II corresponding to the other significant flammable gases. This electrical apparatus shall then be marked appropriately (for example "EEx d I/IIB T3" or "EEx d I/II (NH<sub>3</sub>)").

4.2 Electrical apparatus of Group II may be subdivided according to the nature of the potentially explosive atmosphere for which it is intended.

4.2.1 For the types of protection "d" flameproof enclosure, or "i" intrinsic safety, electrical apparatus of Group II is subdivided into IIA, IIB and IIC as required in the specific European Standards concerning those types of protection.

Note 1: This subdivision is based on the maximum experimental safe gap (MESG) for flameproof enclosures or the minimum ignition current (MIC) for intrinsically safe electrical apparatus (see Annex A)

Note 2: Apparatus marked IIB is suitable for applications requiring Group IIA apparatus. Similarly, apparatus marked IIC is suitable for applications requiring Group IIA or Group IIB apparatus.

4.2.2 For all types of protection, apparatus of Group II shall be marked as a function of its maximum surface temperature according to 5.1.2.

4.3 The electrical apparatus may be tested for a particular explosive atmosphere. In this case it shall be certified and marked accordingly.