



SLOVENSKI STANDARD

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Non-electrical equipment for use in potentially explosive atmospheres - Part 1: Basic method and requirements

iTeh STANDARD PREVIEW

Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 1: Grundlagen und Anforderungen

[SIST EN 13463-1:2009](https://standards.iteh.ai/catalog/standards/sist/8470ad4-530d-4735-bb63-698ace152798/sist-en-13463-1-2009)

Appareils non électriques destinés à être utilisés en atmosphères explosibles - Partie 1: Prescriptions et méthodologie

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Non-electrical equipment for use in potentially explosive atmospheres - Part 1: Basic method and requirements

Appareils non électriques destinés à être utilisés en atmosphères explosibles - Partie 1: Prescriptions et méthodologie

Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 1: Grundlagen und Anforderungen

This European Standard was approved by CEN on 29 November 2008.

CEN 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 CEN Management Centre or to any CEN 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 CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 13463-1:2009) has been prepared by Technical Committee CEN/TC 305 "Potentially explosive atmospheres - Explosion prevention and protection", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2009, and conflicting national standards shall be withdrawn at the latest by July 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13463-1:2001.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directive(s), see informative Annex ZA, which is an integral part of this document.

Annex H provides details of significant technical changes between this European Standard and the previous edition: EN 13463-1:2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

Non-electrical equipment in accordance with this European Standard means mainly mechanical equipment. The extent of explosion protection and prevention measures applied to mechanical equipment differ from those applied to electrical equipment.

Whereas common electrical equipment working within its design parameters often contains effective ignition sources, this is not true for most mechanical equipment. In most cases, the normal operation of mechanical equipment within its design parameters will not lead to ignition of an explosive atmosphere. In other words, most mechanical equipment performing its designed duty without malfunctions and with proper maintenance will not produce ignition sources in normal operation. Thus, additional protective measures that are commonly used for electrical explosion protected equipment (e.g. enclosures) are not needed.

Even where malfunctions have to be considered, much mechanical equipment can meet the requirements for category 2 equipment by a proper choice of well-tried constructional measures that would reduce failures causing ignition sources to an acceptably low level.

Essential to this decision is the use of the ignition hazard assessment to evaluate the potential ignition sources of mechanical equipment and under which conditions they will become effective. This is the fundamental difference to standards for electrical equipment.

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EN 13463-1:2009 (E)

1 Scope

This European Standard specifies the basic method and requirements for design, construction, testing and marking of non-electrical equipment intended for use in potentially explosive atmospheres in air of gas, vapour, mist and dusts. Such atmospheres can also exist inside the equipment. In addition, the external atmosphere can be drawn inside the equipment by natural breathing produced as a result of fluctuations in the equipment's internal operating pressure, and/or temperature.

This European Standard is valid for atmospheres having pressures ranging from 0,8 bar to 1,1 bar and temperatures ranging from - 20 °C to + 60 °C., i.e. equipment built to this European Standard will be satisfactory to any service conditions within this range unless otherwise specified.

NOTE 1 The requirements of this European Standard can also be helpful for the design, construction, testing and marking of equipment intended for use in atmospheres outside the validity range stated above. In this case however, the ignition hazard assessment, ignition protection provided, additional testing (if necessary), manufacturer's technical documentation and instructions to the user, should clearly demonstrate and indicate the equipment's suitability for the conditions it may encounter. It should also be recognized that changes in temperature and pressure can have a significant influence on ignitability.

This European Standard does not cover additional marking for equipment intended for use outside the scope of its validity such as an oxygen-enriched atmosphere.

This European Standard is also applicable for the design, construction, testing and marking of components, protective systems, devices and assemblies of these products which have possible ignition sources and are intended for use in potentially explosive atmospheres.

It specifies the requirements for the design and construction of equipment, intended for use in potentially explosive atmospheres in conformity with all categories of Group I and II. This European Standard can be supplemented by European Standards concerning the specific types of ignition protection.

NOTE 2 These are given below:

EN 13463-2,	Non-electrical equipment for use in potentially explosive atmospheres – Protection by flow restricting enclosure (fr)
EN 13463-3,	Non-electrical equipment for use in potentially explosive atmospheres – Protection by flameproof enclosure (d)
EN 13463-5,	Non-electrical equipment for use in potentially explosive atmospheres – Protection by constructional safety (c)
EN 13463-6,	Non-electrical equipment for use in potentially explosive atmospheres – Protection by control of ignition sources (b)
EN 60079-2,	Electrical apparatus for explosive gas atmospheres – Pressurised enclosures "p" (Protection by pressurization described in EN 60079-2 can also be used for non-electrical equipment.)
EN 13463-8,	Non-electrical equipment for use in potentially explosive atmospheres – Protection by liquid immersion (k)
EN 50303,	Group I, category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust.

NOTE 3 Equipment designed and constructed in accordance with this European Standard for a particular category may be used in areas requiring a category with a higher level of safety by the application of additional explosion prevention and/or protection methods. Such applications are not covered in this standard.

NOTE 4 Such explosion prevention and/or protection measures include for example inerting, suppression, venting or containment as described in EN 1127-1, for Group II equipment or for example by dilution, drainage, monitoring and shut-down as described in EN 1127-2 for Group I equipment. Such explosion protection methods are outside the scope of this European Standard.

NOTE 5 Although the normal atmospheric conditions above give a temperature range for the atmosphere of - 20 °C to + 60 °C the ambient temperature range for the equipment is - 20 °C to + 40 °C unless otherwise specified and marked, see 6.2.2.

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.

EN 582, *Thermal spraying - Determination of tensile adhesive strength*

EN 1127-1:2007, *Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology*

EN 1127-2, *Explosive atmospheres – Explosion prevention and protection – Part 2: Basic concepts and methodology for mining*

EN 13237:2003, *Potentially explosive atmospheres – Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres*

EN 13463-6:2005, *Non-electrical equipment for use in potentially explosive atmospheres – Part 6: Protection by control of ignition source 'b'*

EN 14986, *Design of fans working in potentially explosive atmospheres*

EN 50303:2001, *Group I, category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust*

EN 60079-0:2006, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements (IEC 60079-0:2004, modified)*

ISO 1817:2005, *Rubber, vulcanized – Determination of the effect of liquids*

CLC/TR 50404:2003, *Electrostatics – Code of practice for the avoidance of hazards due to static electricity*

"Seventh Report on the Specifications and Testing Conditions relating to Fire-resistant Hydraulic Fluids Used for Power Transmission (Hydrostatic and Hydrokinetic) in Mines", Commission of the European Communities Safety and Health Commission for Mining and Extractive Industries, Luxembourg 1994

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13237:2003 and the following apply.

3.1

equipment

machines, apparatus, fixed or mobile devices, control components and instrumentation thereof and detection or prevention systems which, separately or jointly are intended for the generation, transfer, storage, measurement, control and conversion of energy and/or the processing of material and which are capable of causing an explosion through their own potential sources of ignition

[EN 1127-1:2007]

NOTE 1 If equipment supplied to the user contains any interconnecting parts e.g. fastenings, pipes, etc. these form part of the equipment.

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NOTE 2 Simple apparatus with no moving parts, containers and pipes on their own are not considered as equipment under the scope of this European Standard.

3.2 equipment category

3.2.1 equipment Group I category M 1

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

NOTE 1 Equipment of 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.

NOTE 2 Equipment of this category is required to remain functional even in the event of rare incidents relating to equipment, with an explosive atmosphere present, and is characterised 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.

3.2.2 equipment Group I category M 2

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

NOTE 1 Equipment of this category is intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust.

NOTE 2 This equipment is intended to be de-energised in the presence of an explosive atmosphere.

NOTE 3 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.

3.2.3 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

NOTE 1 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/dusts mixtures are present continuously, for long periods or frequently.

NOTE 2 Equipment of this category ensures the requisite level of protection, even in the event of rare malfunctions relating to equipment, and is characterised 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.

3.2.4 equipment Group II category 2

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

NOTE 1 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/dusts mixtures are likely to occur.

NOTE 2 The means of protection relating to equipment in this category ensures the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which are normally taken into account.

3.2.5

equipment Group II category 3

equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a normal level of protection

NOTE 1 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/dusts mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

NOTE 2 Equipment of this category ensures the requisite level of protection during normal operation.

3.3

possible ignition source

any kind of ignition source

NOTE 1 See EN 1127-1 for a list of all possible ignition sources.

NOTE 2 See Figure 1

3.4

equipment related ignition source

any possible ignition source, which is caused by the equipment under consideration regardless of its ignition capability

NOTE 1 These are sometimes called "relevant ignition sources", however this can lead to misunderstanding as to whether the ignition source is relevant in terms of it being present, in terms of its ignition capability or in terms of whether it is present in the equipment or not.

NOTE 2 All equipment related ignition sources are considered in the ignition hazard assessment to determine whether they are potential ignition sources.

NOTE 3 See Figure 1

3.5

potential ignition source

equipment related ignition source which has the capability to ignite an explosive atmosphere (i.e. to become effective)

NOTE 1 The probability of becoming effective determines the equipment category (they may arise in normal operation, expected malfunction, rare malfunction).

NOTE 2 See Figure 1

3.6

effective ignition source

potential ignition source which is able to ignite an explosive atmosphere when consideration is taken of when it occurs (i.e. in normal operation, expected malfunction or rare malfunction) which determines the intended category

NOTE 1 An effective ignition source is a potential ignition source which can ignite the explosive atmosphere if preventive or protective measures are not used.

NOTE 2 For example the frictional heat which may be produced by a bearing is a possible ignition source. This is an equipment related ignition source if the piece of equipment contains a bearing. If the energy which may be produced by the friction in the bearing is capable of igniting an explosive atmosphere then this is a potential ignition source. Whether this potential ignition source is effective depends on the probability that it will occur in a particular situation (e.g. following loss of lubrication).

NOTE 3 See Figure 1

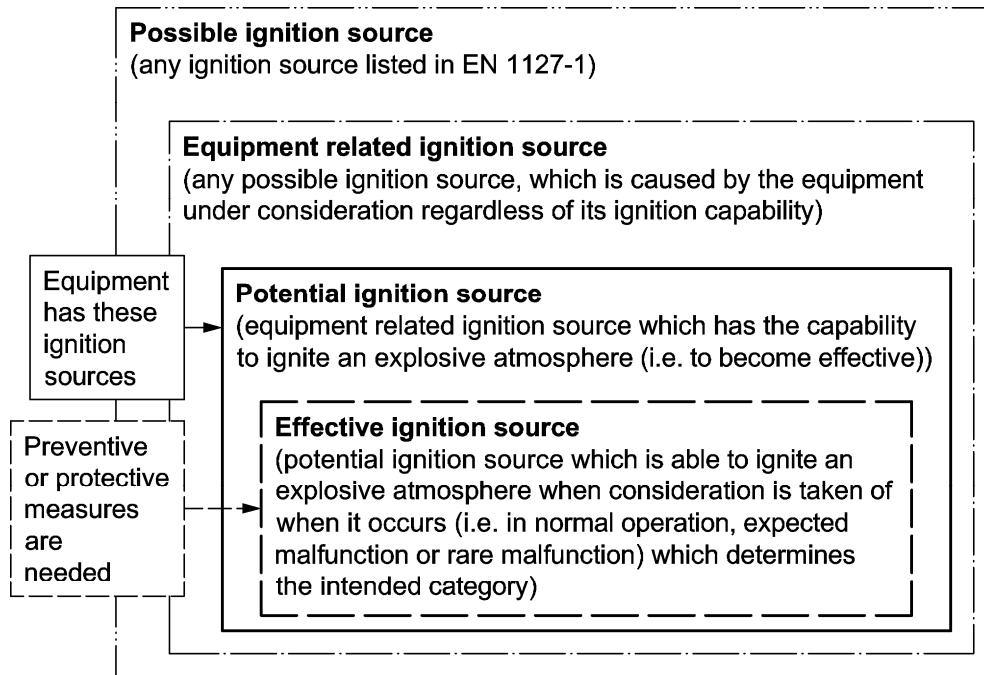


Figure 1 — Relationship between ignition source definitions

3.7 normal operation
situation when the equipment, protective systems, and components are operating for their intended use within their design parameters

NOTE 1 Failures (such as a breakdown of pump seals, flange gaskets or releases of substances caused by accidents) which involve repair or shut-down are not considered to be part of normal operation

NOTE 2 Minor releases of flammable material may be part of normal operation. For example, releases of substances from seals which rely on wetting by the fluid which is being pumped are considered to be minor releases.

[EN 13237:2003]

3.8 malfunction
equipment, protective systems and components do not perform the intended function

NOTE 1 See also EN ISO 12100-1:2003, 5.3 b) 2)

NOTE 2 For the purposes of this standard this can happen due to a variety of reasons, including

- variation of a property or of a dimension of the processed material or of the workpiece;
- failure of one (or more) of the component parts of the equipment, protective systems and components;
- external disturbances (e.g. shocks, vibration, electromagnetic fields);
- design error or deficiency (e.g. software errors);
- disturbance of the power supply or other services;
- loss of control by the operator (especially for hand-held machines).

3.8.1 expected malfunction
disturbances or equipment faults which are known to occur in practice

3.8.2**rare malfunction**

type of malfunction which may happen only in rare instances

NOTE For example, this includes two independent expected malfunctions which, separately, would not create an ignition hazard but which, in combination, do create an ignition hazard, are regarded as a single rare malfunction.

3.9**maximum surface temperature**

temperature used for marking of the equipment which is the highest temperature that can be attained in service under the most adverse operating conditions (but within the recognised tolerance) by any part or surface of equipment, protective system or component which can produce an ignition of the surrounding explosive atmosphere with an appropriate safety margin

NOTE 1 The maximum surface temperature is determined according to 8.2 and includes safety margins depending on the category of the equipment. As a result of the application of safety margins according to 8.2, the maximum surface temperature, in most cases, will be in excess of the highest measured surface temperature.

NOTE 2 The surface temperature which is relevant can be internal or external depending upon the type of ignition protection concerned.

NOTE 3 For equipment intended for use in explosive dust atmospheres, the surface temperature is determined without any deposited dust on the equipment, see 6.2.3.

3.10**maximum possible potential energy**

maximum amount of energy which can be stored in an equipment or in parts of an equipment and can dissipate into kinetic energy during release

3.11**type of ignition protection**

types of protection covered by specific standards

NOTE For information see list in the scope.

3.12**non-electrical equipment**

equipment which can achieve its intended function mechanically

4 Equipment categories and explosion groups**4.1 Equipment category**

Equipment for potentially explosive atmospheres is divided into:

- a) Group I equipment for mines susceptible to firedamp; this group comprises two categories according to the level of safety provided:
 - i. Category M1;
 - ii. Category M2.
- b) Group II Equipment for places with a potentially explosive atmosphere, other than mines susceptible to firedamp; this group comprises three categories according to the level of safety provided:
 - i. Category 1;
 - ii. Category 2;

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iii. Category 3.

Equipment intended for mines where the atmosphere, in addition to firedamp, may contain significant proportions of other flammable gases and/or combustible dusts (i.e. other than methane or coal dust), 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 equipment shall then be marked appropriately.

NOTE Group I equipment tested in a firedamp air mixture does not need any additional testing to demonstrate its suitability for use in an explosive coal dust atmosphere.

This European Standard may be used in conjunction with one or more types of protection described in the standards listed in Clause 1, depending on the ignition hazard assessment in 5.2, to provide the protection required.

4.2 Explosion groups

Equipment of Group II intended for use in explosive gas atmospheres may also be classified according to the nature of the potentially explosive atmosphere for which it is intended. This equipment is classified according to the explosion groups IIA, IIB and IIC.

NOTE 1 This classification is based on the maximum experimental safe gap and the minimum ignition current of the gas mixture, see IEC/TR 60079-12 and IEC/TR 60079-20.

NOTE 2 The explosion groups also may be used to classify equipment with respect to ignitability.

NOTE 3 Equipment explosion sub-groups are shown in Table 1.

Table 1 — Equipment explosion groups

Explosion group of explosive atmosphere	Equipment with explosion group markings that can be used in these atmospheres
IIA	IIA, IIB, IIC
IIB	IIB, IIC
IIC	IIC

Equipment without any explosion group marking can be used for explosive atmospheres of explosion group IIA, IIB and IIC provided the equipment is not marked for specific atmospheres.

For equipment incorporating flame arresters the classification is extended as shown in Table 2 (see EN 12874).

Table 2 — Explosion groups for equipment incorporating flame arresters (subdivisions)

Explosion group	Maximum experimental safe gap (MESG) of gas/air-mixture mm
IIA1 ^a	≥ 1,14
IIA	> 0,90
IIB1	≥ 0,85
IIB2	≥ 0,75
IIB3	≥ 0,65
IIB	≥ 0,50
IIC	< 0,50

^a IIA1 does not include natural gas and is not applicable for detonation arresters.

For general use with explosive atmospheres containing hydrogen, explosion group IIC is required.

4.3 Specific explosive atmospheres

The equipment may be tested for a specific explosive atmosphere. In this case it shall be marked accordingly, see 9.3.2 e).

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5 Ignition hazard assessment

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5.1 General requirements

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Non-electrical equipment for use in potentially explosive atmospheres shall comply with the requirements of this part of EN 13463 and if relevant modified by the specific parts of EN 13463 for other types of ignition protection.

All intended service conditions for the equipment (e.g. rough handling, humidity effects, ambient temperature and pressure variations, effects of chemical agents, corrosion, vibration) shall be specified by the manufacturer and included in the required instructions for use (see Clause 9).

If equipment is designed and constructed according to good engineering practice and the ignition hazard assessment ensures that the equipment does not contain any effective ignition sources in normal operation, the equipment can be classified as category 3 equipment.

Similarly where the ignition hazard assessment confirms that the equipment does not contain any effective

ignition sources during
expected malfunctions or
rare malfunctions,
the equipment can be classified as
category 2 or
category 1 equipment
respectively.

To confirm the category of the equipment, Annex A shall be applied.