

Potentially explosive atmospheres — Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres

The European Standard EN 13237:2003 has the status of a British Standard

ICS 01.040.13; 01.040.29; 13.230; 29.260.20

National foreword

This British Standard is the official English language version of EN 13237:2003.

The UK participation in its preparation was entrusted to Technical Committee FSH/23, Fire precautions in industrial and chemical plant, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, was published under the authority of the Standards Policy and Strategy Committee on 29 August 2003

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

© BSI 29 August 2003

ISBN 0 580 42541 X

ICS 01.040.13; 01.040.29; 13.230; 29.260.20

English version

Potentially explosive atmospheres - Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres

Atmosphères explosibles - Termes et définitions pour les appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles

Explosionsgefährdete Bereiche - Benennungen und Definitionen für Geräte und Schutzsysteme zur Verwendung in explosionsgefährdeten Bereichen

This European Standard was approved by CEN on 9 June 2003.

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 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 Management Centre has the same status as the official versions.

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



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword.....	3
Introduction	4
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
Annex A (informative) Definitions from the Directive 94/9/EC and corrigenda	18
A.1 Explosive atmosphere	18
A.2 Potentially explosive atmosphere	18
A.3 Equipment	18
A.4 Intended use	18
A.5 Protective systems	18
A.6 Equipment group	18
A.6.1 Equipment group I	19
A.6.2 Equipment group II	19
A.7 Component	20
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	21
Bibliography	23

Foreword

This document (EN 13237:2003) 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 December 2003, and conflicting national standards shall be withdrawn at the latest by December 2003.

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 EU Directive(s).

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

Annex A is informative.

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

Introduction

This European Standard has been produced to assist designers, manufacturers and other interested parties to use harmonised terms and definitions (vocabulary) for equipment and protective systems intended for use in potentially explosive atmospheres. It describes the vocabulary to be used to give all standards in this area an overall uniformity of terminology. Throughout this European Standard, the only hazard considered is the explosion of an explosive atmosphere.

1 Scope

This European Standard specifies terms and definitions (vocabulary) to be used in suitable standards dealing with equipment and protective systems intended for use in potentially explosive atmospheres.

NOTE Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this European Standard. The present standard is not intended to provide means of complying with the essential health and safety requirements of Directive 94/9/EC.

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 (including amendments).

EN 746-2:1997, *Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems.*

EN 1127-1:1997, *Explosive atmospheres - Explosion prevention and protection – Part 1: Basic concepts and methodology.*

EN 1127-2 2002, *Explosive atmospheres - Explosion prevention and protection – Part 2: Basic concepts and methodology for mining.*

EN 12874:2001, *Flame arresters – Performance requirements, test methods and limits for use.*

EN 13980:2002, *Potentially explosive atmospheres – Application of quality systems.*

prEN 14373:2002, *Explosion suppression systems.*

EN 50014:1997, *Electrical apparatus for potentially explosive atmospheres - General requirements.*

EN 50015:1998, *Electrical apparatus for potentially explosive atmospheres - Oil-immersion "o".*

EN 50016:1995, *Electrical apparatus for potentially explosive atmospheres - Pressurized apparatus "p".*

EN 50017:1998, *Electrical apparatus for potentially explosive atmospheres – Powder filling "q".*

EN 50018:1994, *Electrical apparatus for potentially explosive atmospheres - Flameproof enclosure "d".*

EN 50019:1994, *Electrical apparatus for potentially explosive atmospheres - Increased safety "e".*

EN 50020:1994, *Electrical apparatus for potentially explosive atmospheres – Intrinsic safety "i".*

EN 50021:1999, *Electrical apparatus for potentially explosive atmospheres – Type of protection “n”*.

EN 50028:1987, *Electrical apparatus for potentially explosive atmospheres – Encapsulation “m”*.

EN 50281-1-1:1998, *Electrical apparatus for use in the presence of combustible dust - Part 1-1: Electrical apparatus protected by enclosures; Construction and testing*.

EN 50281-1-2:1997, *Electrical apparatus for use in the presence of combustible dust - Part 1-2: Electrical apparatus protected by enclosures; Selection, installation and maintenance*.

EN 50281-2-1:1998, *Electrical apparatus for use in the presence of combustible dust – Part 2-1: test methods – Methods of determining the minimum ignition temperature of dust*.

EN 60079-10:1996, *Electrical apparatus for explosive gas atmospheres - Part 10: Classification of hazardous areas (IEC 60079-10:1995)*.

EN 60529:1991, *Degree of protection provided by enclosures (IP code) (IEC 60529:1989 + A1 1999)*.

EN 61779-1:2000, *Electrical apparatus for the detection and measurement of flammable gases – Part 1: General requirements and test methods (IEC 61779-1:1998, modified)*.

EN ISO 9000:2000, *Quality management systems – Fundamentals and vocabulary (ISO 9000:2000)*.

EN ISO 13702:1999, *Petroleum and natural gas industries – Control and migration of fires and explosions on offshore production installations – Requirements and guidelines (ISO 13702:1999)*.

EN ISO 13736:1997, *Petroleum products and other liquids – Determination of flash point – Abel closed cup method (ISO 13736:1997)*.

ISO 4225:1994, *Air quality - General aspects – Vocabulary*.

IEC 60050-191:1990, *International Electrotechnical Vocabulary - Chapter 191: Dependability and quality of service*.

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

IEC 60204-32:1998, *Safety of machinery – Electrical equipment of machines – Part 32: Requirements for hoisting machines*.

3 Terms and definitions

3.1

ambient atmosphere

normal atmosphere surrounding the equipment and protection system

3.2

ambient temperature

temperature of the air or other medium where the equipment is to be used (IEV 426-01-04) (IEC 60204-32:1998)

NOTE For the application of the Directive 94/9/EC only air is considered.

3.3

cable entry

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 (EN 50014:1997)

3.4

clamping device

element of a cable entry for preventing tension or torsion in the cable from being transmitted to the connections (EN 50014:1997)

3.5

clearance

shortest distance measured in air between two conductive parts (EN 50019:1994)

3.6

combustible dust

dust, fibres or flyings that can burn or glow in air and could form explosive mixtures with air at atmospheric pressure and normal temperatures (EN 50281-1-1:1998)

3.7

compound

thermosetting, thermoplastic, and elastomeric materials with or without fillers and/or additives, are considered after their solidification to be compounds (EN 50028:1987)

3.8

compression element

element of a cable entry acting on the sealing ring to enable the latter to fulfil its function (EN 50014:1997)

3.9

conductive dust

dust, fibres or flyings with electrical resistivity equal to or less than $10^3 \Omega\text{m}$ (EN 50281-1-1:1998)

3.10

conduit entry

means of introducing a conduit into an electrical apparatus so as to maintain the relevant type of protection (EN 50014:1997)

3.11

connection facilities

terminals, screws or other parts, used for the electrical connection of conductors of external circuits (EN 50014:1997)

3.12

containment system

part of the apparatus containing the flammable gas, vapour or liquid that may constitute an internal source of release (EN 50016:1995)

NOTE This is related to electrical apparatus where a type of protection "pressurisation" is used.

3.13

continuous grade of release

release which is continuous or is expected to occur for long periods (EN 60079-10:1996)

3.14

creepage distance

shortest distance along the surface of an insulating material between two conductive parts (EN 50019:1994)

3.15

deflagration

explosion propagating at subsonic velocity (EN 1127-1:1997)

3.16

degree of protection

extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and/or ingress of water and verified by standardised test methods (EN 60529:1991)

3.17

degree of protection of enclosure (IP)

numerical classification according to EN 60529:1991 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;
- 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 with the types of protection as defined in EN 50014:1997 under 1.2).

3.18

detonation

explosion propagating at supersonic velocity and characterised by a shock wave (EN 1127-1:1997)

3.19

dust

small solid particles in the atmosphere which settle out under their own weight, but which may remain suspended in air for some time (includes dust and grit, as defined in ISO 4225:1994 (EN 50281-1-2:1998)

NOTE Generally maximum particle size will not exceed 500 µm.

3.20

dust ignition protection

all relevant measures specified in the EN 50281 series of standards (e.g. dust ingress protection and surface temperature limitation) applied to electrical apparatus to avoid ignition of a dust layer or cloud (EN 50281-1-1:1998)

3.21

dust protected enclosure

enclosure in which the ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with the safe operation of the equipment; dust shall not accumulate in a position within the enclosure where it is liable to cause an ignition hazard (EN 50281-1-1:1998)

3.22

dust tight enclosure

enclosure capable of preventing the ingress of all observable dust particles (EN 50281-1-1:1998)

3.23

electrical apparatus

items applied as a whole or in part for the utilisation 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. (EN 50014:1997)

3.24

encapsulation

process of applying the compound to enclose any electrical device(s) by suitable means such as embedding and potting (EN 50028:1987)

3.25

enclosure

(of equipment or protective system) all the walls including doors, covers, cable entries, rods, spindles and shafts which contribute to the type of protection and/or their degree of protection (IP) of the electrical apparatus (EN 50014:1997)

3.26

equipment category

within an equipment group, a category is the classification according to the required level of protection. (See A.6).

3.27

Ex component

part of electrical apparatus or module (other than an Ex cable entry), marked with the symbol "U", which is not intended to be used alone in such atmospheres and requires additional certification when incorporated into electrical apparatus or systems for use in potentially explosive atmospheres (EN 50014:1997)

3.28

explosion

abrupt oxidation or decomposition reaction producing an increase in temperature, pressure or in both simultaneously (EN 1127-1:1997)

3.29

explosions limits

limits of explosion range (EN 1127-1:1997)

3.30

explosion points

lower and upper explosion points (EN 1127-1:1997)

3.31

explosion-pressure-resistant

property of vessels and equipment designed to withstand the expected explosion pressure without becoming permanently deformed (EN 1127-1:1997)

3.32

explosion-pressure-shock resistant

property of vessels and equipment designed to withstand the expected explosion pressure without rupturing, but allowing permanent deformation (EN 1127-1:1997)

3.33

explosion range

range of the concentration of a flammable substance in air, within which an explosion can occur (EN 1127-1:1997)

3.34

explosion resistant

property of vessels and equipment designed to be either explosion-pressure-resistant or explosion-pressure-shock resistant (EN 1127-1:1997)

3.35

explosion suppression system

composite arrangement of devices to detect automatically the onset of an explosion and initiate the deployment of suppressant to limit destructive effects of an explosion (prEN 14373:2002)

3.36

explosion venting system

system designed to prevent an excessive pressure rise in a confined explosive atmosphere by using of vents to allow the escape of substances resulting from explosion

3.37

explosive dust atmosphere

mixture with air under atmospheric conditions, of flammable substances in the form of dust or fibres in which, after ignition, combustion spreads throughout the unconsumed mixture (see IEV 426-02-04)

3.38

explosive gas atmosphere

mixture with air, under atmospheric conditions, of flammable substances in the form of gas or vapour, in which, after ignition, combustion spreads throughout the unconsumed mixture (EN 60079-10:1996)

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.

3.39**explosive test mixture**

specified explosive mixture used for the testing of electrical apparatus for potentially explosive atmospheres (EN 50014:1997)

3.40**firedamp**

any potentially explosive mixture of gases or any flammable gas naturally occurring in a mine (EN 1127-2:2002)

NOTE Because firedamp normally consists mainly of methane, the term 'firedamp' and 'methane' are used frequently in mining practice as synonyms.

3.41**flame arrester**

device fitted to the opening of an enclosure or to the connecting pipework of a system of enclosures and whose intended function is to allow flow, but prevent the transmission of flame (EN 12874:2001)

NOTE This device should not be confused with a fire barrier, which is ineffective in case of explosion.

3.42**flameproof enclosure**

type of protection in which the parts which can ignite an explosive atmosphere are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission or the explosion to the explosive atmosphere surrounding the enclosure (EN 50018:1994)

3.43**flameproof joint**

place where corresponding surfaces of two parts of an enclosure come together, or the conjunction of enclosures, and prevent the transmission of an internal explosion to the explosive atmosphere surrounding the enclosure (EN 50018:1994)

3.44**flammable gas or vapour**

gas or vapour which, when mixed with air in certain proportions, will form an explosive gas atmosphere (EN 60079-10:1996)

3.45**flammable liquid**

liquid capable of producing a flammable vapour under any foreseeable operating condition (EN 60079-10:1996)

3.46**flammable material**

material which is flammable of itself, or is capable of producing a flammable gas, vapour or mist (EN 60079-10:1996)

3.47**flammable mist**

droplets of flammable liquid, dispersed in air so as to form an explosive atmosphere (EN 60079-10:1996)

3.48**flammable substance**

substance in the form of gas, vapour, liquid, solid, or mixtures of these, able to undergo an exothermic reaction with air when ignited (EN 1127-1:1997)

3.49**flash point**

minimum temperature at which, under specific test conditions, a liquid gives off sufficient combustible gas or vapour to ignite momentarily on application of an effective ignition source (EN 1127-1:1997)

3.50

gap of flameproof joint

distance between the corresponding surfaces of a flameproof joint when the electrical apparatus enclosure has been assembled. For cylindrical surfaces, forming cylindrical joints, the gap is the difference between the diameters of the bore and the cylindrical component (EN 50018:1994)

3.51

grades of release

there are three basic grades of release, as listed below in order of decreasing frequency and likelihood of the explosive gas atmosphere being present: a) continuous grade, see 3.13; b) primary grade, see 3.93; c) secondary grade, see 3.104. A source of release may give rise to any one of these grades of release, or to a combination of more than one (EN 60079-10:1996)

3.52

group (of an electrical apparatus for explosive atmospheres)

classification of electrical apparatus related to the explosive atmosphere for which it is to be used (EN 50014:1997)

3.53

group I apparatus

electrical apparatus for mines susceptible to firedamp (EN 61779-1:2000)

NOTE See also the definition of "Group" in annex A.

3.54

group II apparatus

electrical apparatus for places with a potentially explosive atmosphere, other than mines susceptible to firedamp (EN 61779-1:2000)

NOTE See also the definition of "Group" in annex A.

3.55

hazardous area

area in which an explosive 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 equipment

NOTE 1 Layers, deposits and heaps of combustible dust should be considered as a source which can form an explosive atmosphere.

NOTE 2 Normal operation means a situation where installations perform within their design parameters.

NOTE 3 The terms "flammable" and "combustible" are used as synonymous.

3.56

hazardous condition 1

underground parts of mines and those parts of surface installations of such mines endangered by firedamp and/or flammable dusts

NOTE This includes underworkings where the concentration of firedamp is within the explosion range e.g. by malfunction (e.g. breakdown of fans), by sudden release of large amounts of firedamp (gas blow, gas eruption) or by increase of gassing (due to decrease of air pressure or increased coaling) (EN 1127-2:2002).

3.57

hazardous condition 2

underground parts of mines and those parts of surface installations of such mines likely to be endangered by firedamp and/or flammable dusts

NOTE This includes underworkings where the concentration of firedamp in ventilation air flow or firedamp drainage systems is outside the explosion range (EN 1127-2: 2002).

3.58

hybrid mixture

mixture of flammable substances with air in different physical states

NOTE Examples for hybrid mixtures are mixtures of methane, coal dust and air or mixtures of gasoline vapour and gasoline droplets with air (EN 1127-1:1997).

3.59

ignition capable apparatus

apparatus which in normal operation constitutes a source of ignition for a specified explosive atmosphere. This includes electrical apparatus not protected by a type of protection listed in 1.8.1 of EN 50016:1995

3.60

ignition of a dust cloud

initiation of an explosion by the transfer of energy to a dust cloud in air (EN 50281-2-1:1998)

3.61

ignition of a dust layer

ignition shall be considered to have occurred if glowing or flaming is initiated in the material, or a temperature of 450 °C or more, or a temperature rise of 250 K or more above the temperature of the prescribed hot surface, is measured in the test (EN 50281-2-1:1998)

3.62

ignition source

any source with sufficient energy to initiate combustion (EN ISO 13702:1999)

3.63

ignition temperature of a dust cloud

lowest temperature of the hot inner wall of a furnace at which ignition occurs in a dust cloud in air contained therein (EN 50281-2-1:1998)

NOTE When carrying out this test, it is essential that all necessary precautions be taken to safeguard the health of personnel, for example, against the risk of fire, explosion, inhalation of smoke or any toxic products of combustion.

3.64

limiting oxygen concentration (LOC)

maximum oxygen concentration in a mixture of a flammable substance and air and an inert gas, in which an explosion will not occur, determined under specified test conditions (EN 1127-1:1997)

3.65

minimum ignition temperature of a dust layer

lowest temperature of a hot surface at which ignition occurs in a dust layer of specified thickness on this hot surface (EN 50281-2-1:1998)

NOTE 1 Because of the wide range of processes in industry, the ignition of dust layers may be dependent upon local conditions. This method of test is not necessarily representative of all industrial conditions, where account may need to be taken of such factors as the presence of thick layers of dust and of the distribution of temperature in environment.

NOTE 2 When carrying out this test, it is essential that all necessary precautions be taken to safeguard the health of personnel, for example, against the risk of fire, explosion, inhalation of smoke or any toxic products of combustion.

3.66

ignition temperature of an explosive atmosphere

lowest temperature of a heated surface at which, under specified conditions the ignition of an explosive atmosphere will occur

NOTE IEC 60079-4:1975 is only applicable to gas and vapour. For dust, see 3.63.

3.67

increased safety "e"

type of protection applied to electrical apparatus in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks in normal service or under specified abnormal conditions (IEV 426-08-01) (EN 50019:1994)

3.68

inert gas

non-flammable gas which will not support combustion and does not react to produce a flammable gas

3.69

inerting

addition of inert substances to prevent explosive atmospheres (EN 1127-1:1997)

3.70

intended operating conditions

duty assigned to equipment or protective system by the manufacturer and based on rated values given by the manufacturer

NOTE For electrical equipment, "intended operating conditions" is equivalent to "rating"

3.71

intrinsically safe apparatus

electrical apparatus in which all the circuits are intrinsically safe (EN 50020:1994)

3.72

intrinsically-safe circuit

circuit in which any spark or any thermal effect produced in the conditions specified in this standard, which include normal operation and specified fault conditions, is not capable of causing ignition of a given explosive gas atmosphere (EN 50020:1994)

3.73

length (width) of flameproof joint (length of flame path)

shortest path through a flameproof joint from the inside to the outside of a flameproof enclosure (EN 50018:1994)

3.74

lower explosion limit

lower limit of the explosion range (EN 1127-1:1997)

3.75

lower explosion point

temperature of the combustible liquid at which the concentration of the saturated vapour in air is equal to the lower explosion limit (EN 1127-1:1997)

3.76

lower flammable limit

lowest concentration of fuel in air at which the air/fuel mixture is flammable (EN 746-2:1997)

NOTE See also the definition of "flammable substance".

3.77

maintainability

ability of equipment, protective system or component under given conditions of intended use to be retained in, or restored to the state in which it can perform a required function when maintenance is performed in given conditions and using stated procedures and resources (see also IEC 60050:1990)

3.78

maintenance

combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function (IEC 60050-191:1990)

3.79

manufacturer

organisation, situated at a stated location or locations, that carries out or controls such stages in the manufacture, assessment, handling and storage of a product that enables it to accept responsibility for continued compliance of the product with the relevant requirements and undertakes all obligations in that connections (EN 13980:2002)

NOTE The term manufacturer is used instead of “organisation” as used in EN ISO 9001:2000. For the purpose of standard EN 13980:2002, they are interchangeable.

3.80

maximum experimental safe gap

maximum gap of the joint between the two parts of the interior chamber of a test apparatus which, when the internal gas mixture is ignited and under specified conditions, prevents ignition of the external gas mixture through a 25 mm long joint, for all concentrations of the tested gas or vapour in air. The MESG is a property of the respective gas mixture (see also IEC 60050-426:1990, IEC 426-02-11) (EN 1127-1:1997)

3.81

maximum explosion pressure (p_{\max})

maximum pressure occurring in a closed vessel during the explosion of a specific explosive atmosphere determined under specified test conditions (EN 1127-1:1997)

3.82

maximum rate of explosion pressure rise ($(dp/dt)_{\max}$)

maximum value of the pressure rise per unit time during the explosion of a specific atmosphere in a closed vessel under specified test conditions (EN 1127-1:1997)

3.83

maximum service temperature

maximum temperature reached when equipment or protective system is operating at its intended operating conditions (see 3.65)

NOTE Each equipment or protective system may reach a different service temperature in different parts.

3.84

maximum surface temperature

highest temperature which is 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 could be able to produce an ignition of the surrounding explosive atmosphere

NOTE 1 The relevant surface temperature may be internal or external depending upon the type of protection concerned.

NOTE 2 In order to avoid ignition it follows that the maximum surface temperature should always be lower than the ignition temperature of the explosive atmosphere.

NOTE 3 On the aspects of dust layers and their ignition, see EN 50281-2-1:1998.

3.85

minimum ignition energy

lowest energy which is sufficient to effect ignition of the most easily ignitable explosive atmosphere under specified test conditions

3.86

mist

general term applied to a suspension of droplets in a gas

NOTE Mists can be produced by spraying or by other processes.

3.87

most easily ignitable explosive atmosphere

explosive atmosphere with a concentration of flammable substances which under specified conditions, requires the lowest energy for its ignition

3.88

most explosive atmosphere (related to the explosion pressure)

explosive atmosphere with a concentration of flammable substances which under specified conditions, gives the highest value of the maximum explosion pressure after ignition

3.89

normal operation

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

NOTE 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.

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.

3.90

oil immersion (for electrical apparatus for explosive gas atmospheres)

type of protection in which the electrical apparatus or parts of the electrical apparatus are immersed in a protective liquid in such a way that an explosive atmosphere which may be above the liquid or outside the enclosure cannot be ignited (EN 50015:1998)

3.91

powder filling

type of protection in which the parts capable of igniting an explosive atmosphere are fixed in position and completely surrounded by filling material to prevent the ignition of an external explosive atmosphere

NOTE The type of protection may not prevent the surrounding explosive atmosphere from penetrating into the apparatus and Ex components and being ignited by the circuits. However, due to the small free volumes in the filling material and due to the quenching of a flame which may propagate through the paths in the filling material, an external explosion is prevented (EN 50017:1998).

3.92

pressurisation

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, and where necessary by using dilution (EN 50016:1995)

3.93

pressurisation with continuous flow of the protective gas

maintenance of an overpressure within a pressurized enclosure with continuous flow of the protective gas through the enclosure (EN 50016:1995)

3.94

primary grade of release

release which can be expected to occur periodically or occasionally during normal operation (EN 60079-10:1996)

3.95

product

term product covers equipment, protective systems, devices ,components and their combinations as well as software as defined in 3.4.2 of EN ISO 9000:2000 (EN 13980:2002)

3.96

protection against firedamp explosion

explosion prevention and protection in underground parts of mines and those parts of surface installations of such mines liable to be endangered by firedamp or a combustible dust (EN 1127-2: 2002)

3.97

purging

operation of passing a quantity of protective gas through the pressurised enclosure and ducts, so that when a) the protective gas is air, any explosive atmosphere in the pressurised enclosure is reduced to a safe concentration; b) or when the protective gas is inert the concentration of oxygen in the pressurised enclosure is reduced to a safe level (EN 50016:1995)

NOTE This term is related to the type of protection "Pressurisation".

3.98**rated value**

quantity value assigned, generally by the manufacturer, for a specified operating condition of an equipment, protection system or component

3.99**rating**

set of rated values and operating conditions (EN 50014:1997)

3.100**reduced explosion pressure (p_{red})**

pressure generated by an explosion of an explosive atmosphere in a vessel, protected by either explosion relief or explosion suppression (EN 1127-1:1997)

3.101**release rate**

quantity of combustible gas or vapour emitted per unit time from the source of release (EN 60079-10:1996)

3.102**restricted-breathing enclosure**

enclosure that is designed to restrict the entry of gases (EN 50021:1999)

NOTE

Applicable to type of protection "n" of electrical apparatus.

3.103**sealed apparatus**

apparatus designed and constructed in such a manner as to prevent ingress of an external atmosphere during the expansion and contraction of the internally contained liquid during normal operation (EN 50015:1998)

NOTE

Only applicable to the type of protection "oil immersion".

3.104**secondary grade of release**

release which is not expected to occur in normal operation and if it does occur, is likely to do so only infrequently and for short periods (EN 60079-10:1996)

3.105**self ignition of dust in bulk**

ignition of dusts caused by the rate of heat generation from oxidation and/or decomposition reactions of the dust being greater than the rate of heat loss to the surroundings (EN 1127-1:1997)

3.106**service temperature**

temperature reached when the apparatus is operating at its rating (EN 50014:1997)

NOTE

Layers, deposits and heaps of combustible dust should be considered as a source which can form an explosive atmosphere.

3.107**source of release**

point or location from which a flammable gas, vapour or liquid may be released into the atmosphere so that an explosive gas atmosphere could be formed (EN 60079-10:1996)

3.108**static pressurisation**

maintenance of an overpressure within a pressurised enclosure without the addition of protective gas in a hazardous area (EN 50016:1995)

NOTE

The term is related to the type of protection "Pressurisation".

3.109

symbol "U"

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 (EN 50014:1997).

3.110

symbol "X"

symbol used as a suffix to a certificate reference to denote special conditions for safe use (EN 50014:1997)

3.111

temperature class

classification of equipment, protective system or component for explosive atmospheres based on its maximum surface temperature

NOTE For electrical apparatus for explosive atmospheres see EN 50014:1997. A classification of electrical apparatus for explosive atmospheres based on its maximum surface temperature.

3.112

terminal compartment

separate compartment or part of a main enclosure, communicating or not with the main enclosure, and containing connection facilities (EN 50014:1997)

NOTE Related to the general requirement for electrical apparatus in potentially explosive atmosphere and specification for electrical apparatus with type of protection "n".

3.113

threaded door

door which is assembled to a flameproof enclosure by a threaded flameproof joint (EN 50018:1994)

3.114

type of protection

specific measures applied to equipment to avoid ignition of a surrounding atmosphere

3.115

type of protection "n"

type of protection applied to electrical apparatus such that, in normal operation and in certain abnormal conditions specified by EN 50021:1999, 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 (EN 50021:1999).

3.116

upper explosion limit

upper limit of the explosion range (EN 1127-1:1997)

3.117

upper explosion point

temperature of a combustible liquid at which the concentration of the saturated vapour in air is equal to the upper explosive limit (EN 1127-1:1997)

3.118

width of a flameproof joint

see length of a flameproof joint 3.73

3.119

zones for gases/vapours

hazardous areas are classified into zones based upon the frequency of the occurrence and the duration of an explosive gas atmosphere, the following definitions are only applicable to equipment group II

NOTE Normal operation means the situation when installations are used within their design parameters

3.119-1

zone 0

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

3.119-2

zone 1

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

3.119-3

zone 2

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

3.120

zones for dust

hazardous areas are classified into zones based upon the frequency of the occurrence and the duration of an explosive dust/air mixtures, the following definitions are only applicable to equipment group II

NOTE 1 Layers, deposits and heaps of combustible dust may be considered and any other source which can form an explosive atmosphere.

NOTE 2 Normal operation means the situation when installations are used within their design parameters.

3.120-1

zone 20

place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently

3.120-2

zone 21

place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally

3.120-3

zone 22

place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only

Annex A (informative)

Definitions from the Directive 94/9/EC and corrigenda

The following definitions are from the Directive 94/9/EC. The user should check the latest version of the Directive for possible changes.

A.1 Explosive atmosphere

Mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

A.2 Potentially explosive atmosphere

An atmosphere which could become explosive due to local and operational conditions.

A.3 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.

A.4 Intended use

The use of equipment, protective systems, and devices, referred to in the note below in accordance with the equipment group and category and with all the information supplied by the manufacturer which is required for the safe functioning of equipment, protective system and devices.

NOTE The above mentioned devices are safety devices, controlling and regulating ones intended for use outside potentially explosive atmospheres but required for or contributing to the safe functioning of equipment and protective systems with respect to the risks of explosion.

A.5 Protective systems

Devices other than components (see A.6) of the equipment which are intended to halt incipient explosions immediately and/or to limit the effective range of an explosion and which are placed separately on the market as autonomous systems.

A.6 Equipment group

Equipment is classified in relation with the explosive atmosphere for which it is to be used. Two groups are defined as follows:

- Equipment group I: this equipment is intended for use in underground parts of mines, and in those parts of surface installation of such mines, liable to be endangered by firedamp and/or combustible dust;
- Equipment group II: this equipment is intended for use in other places liable to be endangered by explosive atmospheres.

A.6.1 Equipment group I

- a) Category M 1 comprises 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 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.

- b) Category M 2 comprises equipment designed 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 of 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 energised 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.

A.6.2 Equipment group II

- a) Category 1 comprises 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 shall ensure the requisite level of protection, even in the event of rare incidents relating to equipment, and is characterised by means of protection such that:

- either, in the event of failure of one mean 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.

- b) Category 2 comprises 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.

- c) Category 3 comprises 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, vapours, 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.

A.7 Component

Any item essential to the safe functioning of equipment and protective systems.

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of the following EU Directive:

Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The clauses of this European Standard are likely to support requirements of the above mentioned Directive. The following table established the relationship between the relevant requirements in articles 1, 2 and Annexes I and II of the Directive and the relevant clauses of this European Standard.

Table ZA.1 — Relationship between this European Standard and Directive 94/9/EC

Essential requirement of Directive 94/9/EC	Reference in prEN 13237
Article 1, section 3	A.1, A.2, A.3, A.4, A.5, A.6, A.7 3.56, 3.57, 3.26, 3.54, 3.63, 3.119, 3.120
Article 2, section 1	3.1, 3.2, 3.55, 3.70, 3.77, 3.78, 3.79, 3.83, 3.84, 3.89, 3.98, 3.99, 3.106
Annex I	A.6
Annex II, 1.0 General requirements	
1.0.1 Principles of integrated explosion safety	3.13,3.51,3.62, 3.94, 3.101, 3.104, 3.107, 3.114
1.0.2 Principles of integrated explosion safety	3.55
1.0.4 Surrounding area conditions	3.1, 3.2
1.0.6 Instructions a)	3.70, 3.77, 3.78, 3.84, 3.99, 3.100, 3.107, 3.112
1.0.6 Instructions b), c)	3.77, 3.78
1.1 Selection of materials	3.70, 3.83, 3.84, 3.98, 3.99, 3.106
1.2.1	3.17, 3.25, 3.31, 3.33, 3.34, 3.35, 3.36, 3.41 3.51, 3.69, 3.77, 3.78, 3.84, 3.114
1.2.3 Enclosed structures and prevention of leaks	3.25, 3.46, 3.94, 3.101, 3.104, 3.107, 3.114
1.2.4 Dust deposits	3.21, 3.61, 3.65, (NOTE 3 under 3.84)
1.2.7 Protection against other hazards	3.16, 3.17
1.2.9 Flameproof enclosure systems	3.25, 3.42, 3.43, 3.73, 3.80, 3.113
1.3.1 Hazards arising from different ignition sources	3.59, 3.60, 3.61, 3.62, 3.63, 3.65, 3.66,3.84, 3.85, 3.87
1.3.4 Hazards arising from overheating	3.20, 3.21, 3.84
1.6.4 Hazards arising from connections	3.3, 3.4, 3.10, 3.11
3.0.1	A.5, 3.31, 3.32, 3.33, 3.34,3.35, 3.36, 3.41, 3.42, 3.96, 3.100
3.1.3	3.81, 3.82, 3.100
3.1.4	3.31, 3.32, 3.34
3.1.5	3.36, 3.100
3.1.6	3.35, 3.100
3.1.7	3.41

Bibliography

EN ISO 9001:2000, *Quality management systems – Requirements (ISO 9001:2000)*.

IEC 60050-426, *International electrotechnical vocabulary – Chapter 426: Electrical apparatus for explosive atmospheres*.

IEV 426:1995, *International Electrotechnical Vocabulary – Chapter 426: Electrical apparatus for explosive atmospheres*.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.
Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001.
Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at <http://www.bsi-global.com>.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.
Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.
Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001.
Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at <http://www.bsi-global.com/bsonline>.

Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

Details and advice can be obtained from the Copyright & Licensing Manager.
Tel: +44 (0)20 8996 7070. Fax: +44 (0)20 8996 7553.
Email: copyright@bsi-global.com.