BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 13237:2024. It supersedes BS EN 13237:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EXL/23, Explosion and fire precautions in industrial and chemical plant.

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

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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 - Begriffe für Geräte und Schutzsysteme zur Verwendung in explosionsgefährdeten Bereichen

This European Standard was approved by CEN on 12 August 2024.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 13237:2024) 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of an identical text or by endorsement, at the latest by April 2025, and conflicting national standards shall be withdrawn at the latest by April 2025.

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

This document supersedes EN 13237:2012.

The significant technical changes between this document and EN 13237:2012 are given in Annex B, Table B.1.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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Introduction

This document has been produced to assist designers, manufacturers and other interested parties to use harmonized 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 document, the only hazard considered is the explosion of an explosive atmosphere.

1 Scope

This document specifies terms and definitions (vocabulary) to be used in suitable standards dealing with equipment and protective systems intended for use in potentially explosive atmospheres within the scope of Directive 2014/34/EU.

NOTE Terms and definitions avoid misunderstandings that are important in relation to the essential health and safety requirements of Directive 2014/34/EU.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
air flow velocity
volume of air [m^3] which flows through a defined surface [m^2] per unit time [s]

[SOURCE: EN 17077:2018, 3.1]

3.2
ambient atmosphere
normal atmosphere surrounding the equipment and protective system

3.3
ambient temperature
temperature of the air or other media, in the immediate vicinity of the equipment or component

[SOURCE: EN IEC 60079-0:2018[1], 3.1, modified – Note 1 to entry, Note 2 to entry and Note 3 to entry have been removed]

3.4
atmospheric conditions
conditions with pressures ranging from 80 kPa to 110 kPa and temperatures ranging from −20°C to +60°C

[SOURCE: EN ISO 16852:2016, 3.25]

Note 1 to entry: EN ISO 16852 will be replaced by EN ISO/IEC 80079-49[2].

[1] As impacted by EN IEC 60079-0:2018/AC:2020-02 and EN IEC 60079-0:2018/A11:2024.
[2] To be published. Stage at the time of publication: FprEN ISO/IEC 80079-49.

3.5
combustible dust
finely divided solid particles, 500 µm or less in nominal size, which can form explosive mixtures with air at standard atmospheric pressure and temperatures

Note 1 to entry: This includes dust and grit as defined in ISO 4225:2020.

Note 2 to entry: The term "solid particles" is intended to address particles in the solid phase but does not preclude a hollow particle.

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.1, modified — "may" has been replaced with "can"; reference date in Note 1 to entry has been updated]

3.5.1
conductive dust
combustible metal dusts and other combustible dusts with electrical resistivity equal to or less than $1 \times 10^3\ \Omega\ m$

Note 1 to entry: Metal dust is treated as conductive dust because it is assumed that surface oxidation cannot be depended upon to always ensure electrical resistivity greater than $1 \times 10^3\ \Omega\ m$

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.1.1

3.5.2
non-conductive dust
combustible dust with electrical resistivity greater than $1 \times 10^3\ \Omega\ m$

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.1.2]

3.6
combustible flyings
solid particles, including fibres, where one dimension is greater than 500 µm in nominal size, which may form an explosive mixture with air at standard atmospheric pressure and temperature

Note 1 to entry: The ratio of length to width is 3 or more.

Note 2 to entry: Examples of flyings include carbon fibre, rayon, cotton (including cotton linters and cotton waste), sisal, jute, hemp, cocoa fibre, oakum and baled waste kapok.

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.2]

3.7
constructional safety "c"
ignition protection where constructional measures are applied so as to protect against the possibility of ignition from hot surfaces, sparks and adiabatic compression generated by moving parts

[SOURCE: EN ISO 80079-37:2016, 3.1]

[3] As impacted by EN ISO/IEC 80079-20-2:2016/AC:2017.

3.8
control of ignition source "b"
ignition protection where mechanical or electrical devices are used in conjunction with nonelectrical equipment to manually or automatically reduce the likelihood of a potential ignition source from becoming an effective ignition source

Note 1 to entry: This might for example be a level sensor used to indicate loss of oil, a temperature sensor to indicate a hot bearing or a speed sensor to indicate over-speed.

[SOURCE: EN ISO 80079-37:2016, 3.3]

3.9
control measure

3.9.1
automatic control measure
action taken without manual intervention, to reduce the likelihood of a potential ignition source from becoming an effective ignition source

[SOURCE: EN ISO 80079-37:2016, 3.3.1]

3.9.2
manual control measure
action taken by a person as a result of a warning, indication, or alarm, to reduce the likelihood of a potential ignition source from becoming an effective ignition source

[SOURCE: EN ISO 80079-37:2016, 3.3.2]

3.10
ignition prevention device
ignition prevention system
arrangement that converts signals from one or more sensors into an action, or indication, to reduce the likelihood of a potential ignition source from becoming an effective ignition source

[SOURCE: EN ISO 80079-37:2016, 3.3.3, modified – "ignition prevention devices/systems" has been replaced with "ignition prevention device" and "ignition prevention system"]

3.11
safety device
device intended for use inside or outside explosive atmospheres but required for or contributing to the safe functioning of equipment and protective systems with respect to the risks of explosion

[SOURCE: EN ISO 80079-37:2016, 3.3.4, modified – "devices" has been replaced with "device" (twice)]

3.12
continuous grade of release
release which is continuous or is expected to occur frequently or for long periods

[SOURCE: EN IEC 60079-10-1:2021, 3.4.2, modified – Note 1 to entry has been deleted]

3.13
deflagration
explosion propagating at subsonic velocity

[SOURCE: ISO 8421-1:1987, 1.11]

3.14
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

[SOURCE: EN 60529:1991[4], 3.3]

3.15
detonation
explosion propagating at supersonic velocity and characterised by a shock wave

[SOURCE: ISO 8421-1:1987, 1.12]

3.16
dust
small solid particles in the atmosphere which settle out under their own weight, but which may remain suspended in air for some time

Note 1 to entry: Generally combustible dusts with a median value of the particle diameter below 500 µm may form explosible dust/air-mixtures.

[SOURCE: EN 14034-1:2004+A1:2011, 3.1, modified — Note 1 to entry has been changed]

3.17
electrical equipment
items applied as a whole or in part for the utilisation of electrical energy

Note 1 to entry: These include, among others, items for the generation, transmission, distribution, storage, measurement, regulation, conversion and consumption of electrical energy and items for telecommunications.

[SOURCE: EN IEC 60079-0:2018[1], 3.31.1]

3.18
electrostatic leakage resistance
electrical resistance measured between an object and earth

[SOURCE: EN 14983:2007, 3.1]

3.19
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)

[4] As impacted by EN 60529:1991/A1:2000, EN 60529:1991/A2:2013, EN 60529:1991/AC:2016-12 and EN 60529:1991/corrigendum May 1993.

3.20
equipment grouping
classification system of equipment related to the explosive atmosphere for which they are intended to be used

[SOURCE: EN IEC 60079-0:2018[1], 3.32, modified – Note 1 to entry deleted]

3.21
Ex Component
part of Ex Equipment or a module, marked with the symbol "U" which is not intended to be used alone and requires additional consideration when incorporated into Ex Equipment or systems for use in explosive atmospheres

[SOURCE: EN ISO 80079-36:2016[5], 3.9]

3.22
Ex Equipment
equipment where measures have been applied to ensure that effective ignition sources are mitigated as required by the Equipment Protection Level (EPL)

Note 1 to entry: This includes the ignition hazard assessment and/or protective measures in accordance with EN ISO 80079 36:2016.

[SOURCE: EN ISO 80079-36:2016[5], 3.11, modified – in the Note 1 to entry "this standard" has been replaced with the standard reference]

3.23
explosion
sudden increase of pressure and temperature, due to oxidation or other exothermic reaction

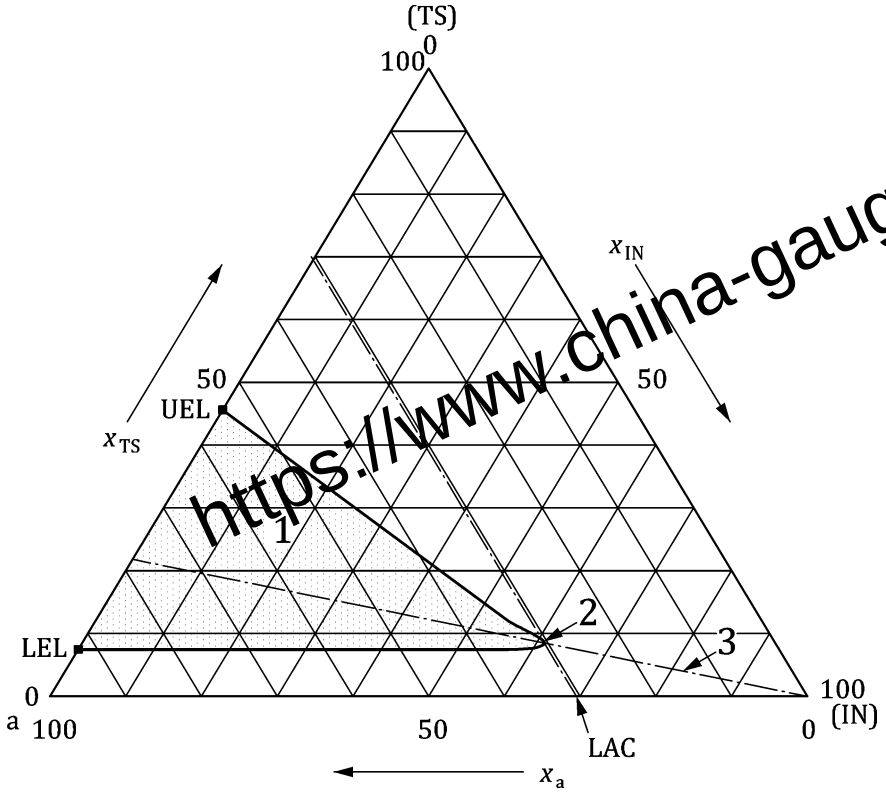
[SOURCE: EN ISO/IEC 80079-38:2016[6], 3.6]

3.24
explosion region
area inside the boundary curve formed by the explosion limits of a flammable substance in various mixtures with air and inert gas

Note 1 to entry: In many cases the air concentration at the apex of the boundary curve corresponds to the limiting air concentration, LAC.

Note 2 to entry: In many cases this is also called explosion range.

[5] As impacted by EN ISO 80079-36:2016/AC:2019.
[6] As impacted by EN ISO/IEC 80079-38:2016/A1:2018.



Key

1	explosion region
2	apex
3	stoichiometric line
x	molar fraction in %
IN	inert gas
TS	test substance
a	air
LAC	Limiting air concentration
LEL	Lower explosion limit
UEL	Upper explosion limit

Figure 1 — Explosion region for a ternary system of test substance, air and inert gas

3.25
explosion diverter
passive device typically installed in a duct preventing flame jet ignition, pressure piling and reducing the probability of flame transmission into connected equipment

3.26
explosion isolation flap valve
valve containing a flap which is fixed to the housing on an axis perpendicular to the flow direction, kept open by the process flow and able to stop explosions from propagating through pipelines in the direction opposite to the normal process flow through the valve

[SOURCE: EN 16447:2014, 3.1, modified — Note 1 to entry has been deleted]

3.27
explosion isolation system

3.27.1
active explosion isolation system
protective system which is designed to stop explosions from travelling through pipelines and is activated by detectors and control and indicating equipment (CIE) which are inherent parts of the system

[SOURCE: EN 15089:2009, 3.7.1, modified — definition has been changed]

3.27.2
passive explosion isolation system
protective system which is designed to stop explosions from travelling through pipelines and does not require detectors and a control and indicating equipment (CIE)

[SOURCE: EN 15089:2009, 3.7.2, modified — definition has been changed]

3.28
explosion limits

3.28.1
lower explosion limit
LEL
lowest concentration of the explosion range

Note 1 to entry: Those concentrations are given at which an explosion just fails during the tests.

[SOURCE: EN 1839:2017, 3.3, modified – Note 1 to entry]

3.28.2
upper explosion limit
UEL
highest concentration of the explosion range

Note 1 to entry: Those concentrations are given at which an explosion just fails during the tests.

[SOURCE: EN 1839:2017, 3.4, modified – Note 1 to entry]

3.29
explosion points

3.29.1
lower explosion point
temperature of a flammable liquid at which the concentration of the saturated vapour in air is equal to the lower explosion limit

3.29.2
upper explosion point
temperature of a flammable liquid at which the concentration of the saturated vapour in air is equal to the upper explosion limit

3.30
explosion pressure
p_{ex}
highest pressure occurring in a closed vessel during the explosion of a specific mixture of flammable substances with air or air and inert gases determined under specified test conditions

Note 1 to entry: p_{ex} is expressed as absolute pressure with gases and vapour and as overpressure with dusts.

[SOURCE: EN 15967:2022, 3.1, modified - Note 1 to entry has been modified]

3.30.1
maximum explosion pressure
p_{max}
maximum value of explosion pressure measured in the tests for explosion pressure when the content of the flammable substances in the mixture is varied

Note 1 to entry: p_{max} is expressed as absolute pressure with gases and vapour and as overpressure with dusts.

[SOURCE: EN 15967:2022, 3.2, modified - Note 1 to entry has been modified]

3.30.2
rate of explosion pressure rise
$(dp/dt)_{ex}$
highest value of the slope (first derivative) of the pressure-time curve (smoothed if necessary), measured in a closed vessel during the explosion of a specific mixture of flammable substances with air or air and inert substances determined under specified test conditions

[SOURCE: EN 15967:2022, 3.3]

3.30.3
maximum rate of explosion pressure rise
$(dp/dt)_{max}$
maximum value of the explosion pressure rise per unit time measured in the tests when the content of the flammable substances in the mixture is varied

[SOURCE: EN 15967:2022, 3.4, modified — Note 1 to entry has been deleted]

3.31
explosion resistant
property of vessels and equipment designed to be either explosion-pressure-resistant or explosion-pressure-shock resistant

3.31.1
explosion-pressure-resistant
property of vessels and equipment designed to withstand the expected explosion pressure without becoming permanently deformed

3.31.2
explosion-pressure-shock resistant
property of vessels and equipment designed to withstand the expected explosion pressure without rupturing, but allowing permanent deformation

3.32
explosion suppression
technique limiting and/or avoiding the destructive effect of an explosion by the deployment of suppressant

[SOURCE: EN 14373:2021, 3.8]

3.33
explosion suppression system
arrangement comprising one or more explosion detectors, control and indicating equipment and one or more high rate discharge suppressors aiming at achieving explosion suppression

[SOURCE: EN 14373:2021, 3.9]

3.34
explosion venting
protective measure which will prevent the explosion pressure in a vessel or other closed volume from exceeding the vessel design strength by exhausting the explosion through an explosion venting device in the vessel walls

[SOURCE: EN 14797:2006, 3.3]

3.35
explosion venting device
device which protects a vessel or other closed volume by explosion venting

[SOURCE: EN 14797:2006, 3.4]

3.36
hazardous explosive atmosphere
explosive atmosphere which causes harm, if it explodes

3.37
explosive dust atmosphere
mixture with air, under atmospheric conditions, of combustible substances in the form of dust, fibres, or flyings which, after ignition, permits self-sustaining propagation

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.3]

3.38
minimum ignition temperature of a dust cloud
lowest temperature of a hot surface on which the most ignitable mixture of the dust with air is ignited under specified test conditions

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.5]

3.39
minimum ignition temperature of a dust layer
lowest temperature of a hot surface at which ignition occurs in a dust layer under specified test conditions

[SOURCE: EN ISO/IEC 80079-20-2:2016[3], 3.4]

3.40
minimum ignition energy (of a combustible dust/air mixture)
lowest electrical energy stored in a capacitor which upon discharge is sufficient to effect ignition of the most sensitive dust/air mixture under specified test conditions

[SOURCE : EN ISO/IEC 80079-20-2:2016[3], 3.6]

3.41
extinguishing barrier
active explosion isolation system that is used to discharge suppressant agent into ductwork to isolate a flame and keep it from propagating to other process areas

[SOURCE: EN 15089:2009, 3.11, modified — definition has been changed]

3.42
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

Note 1 to entry: This device should not be confused with a fire barrier, which is ineffective in case of explosion.

[SOURCE: EN ISO 16852:2016, 3.1, modified – Note 1 to entry has been added]

3.43
flame arrester element
portion of a flame arrester whose principal function is to prevent flame transmission

[SOURCE: EN ISO 16852:2016, 3.3]

3.44
flameless explosion venting
explosion venting protective measure which will in addition prevent the transmission of flames and reduce the external explosion effects

Note 1 to entry: Examples of external explosion effects are: temperature, pressure and dust/combustion products.

[SOURCE: EN 16009:2011, 3.1]

3.45
flameless explosion venting device
device which protects a vessel or other closed volume by flameless explosion venting

[SOURCE: EN 16009:2011, 3.2]

3.46
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 of the explosion to the explosive atmosphere surrounding the enclosure

3.47
flameproof joint
place where the corresponding surfaces of two parts of an enclosure, or the conjunction of enclosures, come together and which prevents the transmission of an internal explosion to the explosive gas atmosphere surrounding the enclosure

[SOURCE: EN 60079-1:2014[7], 3.3]

3.47.1
gap of flameproof joint i
distance between the corresponding surfaces of a flameproof joint when the electrical apparatus enclosure has been assembled

Note 1 to entry: For cylindrical surfaces, forming cylindrical joints, the gap is the difference between the diameters of the bore and the cylindrical component.

[SOURCE: EN 60079-1:2014[7], 3.6]

3.47.2
width of a flameproof joint *L*
shortest path through a flameproof joint from the inside to the outside of an enclosure

Note 1 to entry: This definition does not apply to threaded joints.

[SOURCE: EN 60079-1:2014[7], 3.4]

3.48
flame velocity
S_f
velocity of a flame front relative to a fixed reference point

[SOURCE: EN 15089:2009, 3.14]

3.49
flammable gas or vapour
gas or vapour which, when mixed with air in certain proportions, will form an explosive gas atmosphere

[SOURCE: EN IEC 60079-10-1:2021, 3.6.4]

3.50
flammable liquid
liquid capable of producing a flammable vapour under any foreseeable operating conditions

[SOURCE: EN IEC 60079-10-1:2021, 3.6.2, modified — original Notes to entry deleted]

3.51
flammable mist
droplets of liquid, dispersed in air so as to form an explosive atmosphere

[SOURCE: EN IEC 60079-10-1:2021, 3.6.5]

[7] As impacted by EN 60079-1:2014/AC:2018-09 and EN 60079-1:2014/A11:2024.

3.52
flammable substance
combustible substance
substance in the form of gas, vapour, liquid, solid or mixtures of these, able to undergo an exothermic reaction with air when ignited

Note 1 to entry: For solids the term combustible substance is preferred; for gas, vapour and liquids the term flammable substance is preferred.

3.53
flash point
FP
lowest liquid temperature at which, under specified test conditions, a liquid gives off vapours in quantity such as to be capable of forming an ignitable vapour-air mixture

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.8]

3.54
flammable limits
lower flammable limit (LFL) and upper flammable limit (UFL) of gas in a gas-air mixture, between which a flammable mixture is formed

Note 1 to entry: The term “explosive limits” is used especially in European standardization and regulations interchangeably to describe these limits.

Note 2 to entry: The concentration can be expressed as either a volume fraction or a mass per unit volume.

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.6]

3.54.1
lower flammable limit
LFL
concentration of flammable gas or vapour in air, below which an explosive gas atmosphere does not form

Note 1 to entry: For the purposes of Ex Equipment, this was previously referred to as the lower explosive limit (LEL).

Note 2 to entry: The concentration can be expressed as either a volume fraction or a mass per unit volume.

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.6.1]

3.54.2
upper flammable limit
UFL
concentration of flammable gas or vapour in air, above which an explosive gas atmosphere does not form

Note 1 to entry: For the purposes of Ex Equipment, this was previously referred to as the upper explosive limit (UEL).

Note 2 to entry: The concentration can be expressed as either a volume fraction or a mass per unit volume.

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.6.2]

3.55
functional safety
part of the overall safety relating to the intended use in terms of the function and integrity of the protective system including any safety related devices that are part of the protective system performance

Note 1 to entry: Functional safety covers all aspects where safety depends on the correct functioning of the protective system and other technology safety-related systems.

Note 2 to entry: This definition deviates from the definition in EN 61508-4:2010, 3.1.12 to reflect differences in explosion safety terminology.

[SOURCE: EN 15233:2007, 3.2, modified - year of release of EN 61508-4 has been added to Note 2 to entry]

3.55.1
functional safety estimation
determination of the probability of occurrence of the failures violating the functional safety of the protective system

[SOURCE: EN 15233:2007, 3.4]

3.55.2
functional safety evaluation
procedure to determine whether the functional safety of the protective system meets the predefined acceptance criteria

[SOURCE: EN 15233:2007, 3.5]

3.56
gas
gaseous phase of a substance that cannot reach equilibrium with its liquid or solid state in the temperature and pressure range of interest

Note 1 to entry: This is a simplification of the scientific definition, and merely requires that the substance is above its boiling point or sublimation point at the ambient temperature and pressure.

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.9]

3.57
gas explosion constant
K_G
maximum value of the pressure rise per unit time $(d_p/d_t)_{max}$ during the explosion of a specific explosive atmosphere involving gas or vapour in a closed vessel under specified test conditions normalised to a vessel volume of 1 m^3 multiplied by $V^{1/3}$

[SOURCE: EN 14491:2012, 3.5]

3.58
geometric vent area
A_v
ratio of required vent area A and venting efficiency E_f for the venting device

Note 1 to entry: The geometric vent area is the minimum cross-sectional flow area of the vent opening, taking into consideration the possible reduction of the cross section, e.g. by back pressure supports, retaining devices and parts of the explosion venting device which remain after bursting or venting.

[SOURCE: EN 14491:2012, 3.6]

3.59
glowing
combustion with light emission without visible flame

[SOURCE: EN 17077:2018, 3.6]

3.60
hybrid mixture
mixture of flammable substances in different physical states with air

3.61
ignition
initiation of combustion

[SOURCE: EN 17077:2018, 3.3]

3.61.1
auto-ignition
reaction which is evidenced by a clearly perceptible flame and/or explosion, and for which the ignition delay time does not exceed 5 min

Note 1 to entry: For test procedure see EN ISO/IEC 80079-20-1:2019, 7.2.2

Note 2 to entry: This definition is only valid for gases and vapours according to the scope of the source standard.

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.1, modified – Note 2 to entry has been added.]

3.61.2
auto-ignition temperature
AIT
lowest temperature (of a surface) at which under specified test conditions an ignition of a flammable gas or vapour in mixture with air or air-inert gas occurs

Note 1 to entry: For test procedure see EN ISO/IEC 80079-20-1:2019, Clause 7.

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.3]

3.61.3
ignition delay time
time between the completed injection of the flammable material and the ignition

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.2]

3.62
ignition hazard
occurrence of a potential ignition source that is capable of igniting an explosive atmosphere

[SOURCE: EN 15198:2007, 3.2]

3.63
ignition risk
probability of occurrence of an ignition source that is capable of igniting an explosive atmosphere

[SOURCE: EN 15198:2007, 3.1]

3.63.1
ignition risk estimation
determination of the probability of the occurrence of an ignition source

[SOURCE: EN 15198:2007, 3.5]

3.63.2
ignition risk evaluation
procedure to determine whether the intended level of protection (related to the equipment category) has been achieved

[SOURCE: EN 15198:2007, 3.6]

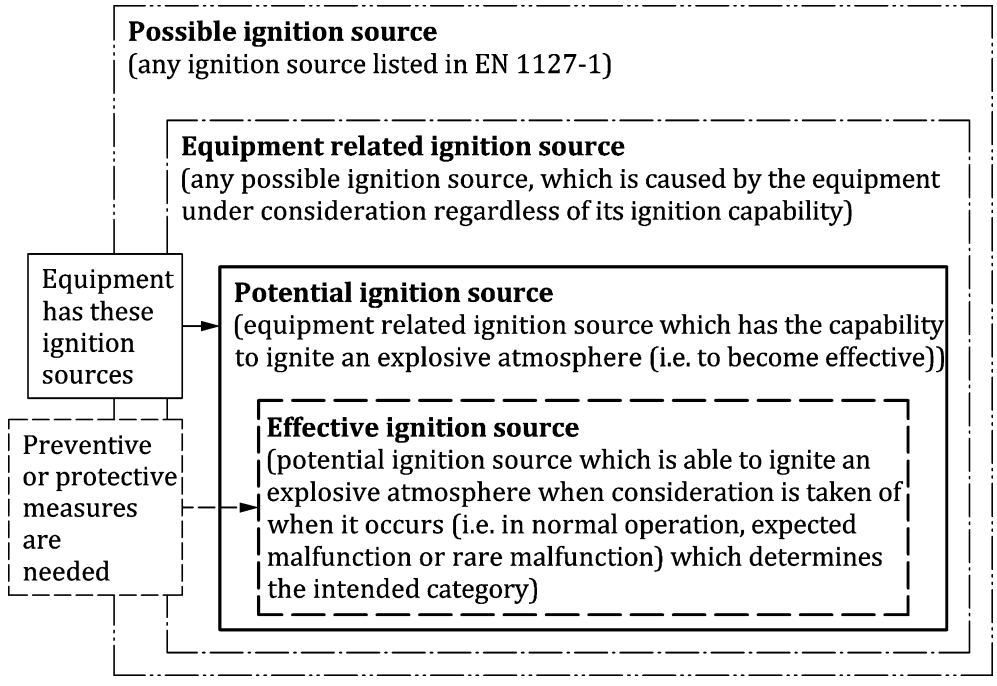


Figure 2 — Relationship between ignition source definitions

3.64
ignition source scenarios

3.64.1
possible ignition source
type of ignition source to be considered for the identification of ignition hazards

Note 1 to entry: Possible ignition sources include:

— hot surfaces;
— flames and hot gases (including hot particles);
— mechanically generated sparks;
— electrical source;
— stray electric currents, cathodic corrosion protection;
— static electricity;
— lightning;
— radio frequency (RF) electromagnetic waves from 10^4 Hz to 3×10^{12} Hz;
— electromagnetic waves including optical radiation from 3×10^{11} Hz to 3×10^{15} Hz;
— ionizing radiation;
— ultrasonics;
— adiabatic compression and shock waves;
— exothermic reactions, including self-ignition of dust.

Note 2 to entry: See also EN ISO 80079-36:2016[5], Annex B for information of possible ignition sources.

Note 3 to entry: See EN ISO 80079-36:2016[5], Figure 1.

[SOURCE: EN ISO 80079-36:2016[5], 3.1.1]

3.64.2
equipment related ignition source
possible ignition source which could be caused by the equipment under consideration regardless of its ignition capability

Note 1 to entry: 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 to entry: All equipment related ignition sources are considered in the ignition hazard assessment to determine whether they are potential ignition sources.

Note 3 to entry: See EN ISO 80079-36:2016[5], Figure 1, which is numbered as Figure 2 in this document.

[SOURCE: EN ISO 80079-36:2016[5], 3.1.2, modified – Note 3 to entry has been replaced by a new Note 3 to entry]

3.64.3
potential ignition source
equipment related ignition source which has the capability to ignite an explosive atmosphere (i.e. to become effective)

Note 1 to entry: The likelihood of becoming effective determines the EPL (they may arise in normal operation, expected malfunction, rare malfunction).

Note 2 to entry: Equipment Protection Level (EPL) is assigned to equipment based on its likelihood of becoming a source of ignition and distinguishing the differences between explosive gas atmospheres, explosive dust atmospheres, and the explosive atmospheres in mines susceptible to firedamp (see EN IEC 60079-0:2018[1], 3.33).

[SOURCE: EN ISO 80079-36:2016[5], 3.1.3, modified – Note 2 to entry has been added]

3.64.4
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)

Note 1 to entry: This is important for establishing the EPL.

Note 2 to entry: An effective ignition source is a potential ignition source which can ignite the explosive atmosphere if protective measures are not used.

Note 3 to entry: 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 likelihood that it will occur in a particular situation.

[SOURCE: EN ISO 80079-36:2016[5], 3.1.4]

3.65
incendive sparks
mechanical sparks with sufficient thermal energy to ignite a flammable atmosphere

[SOURCE: EN ISO/IEC 80079-38:2016[6], 3.20]

3.66
inert gas
gas that does not react with the test substance or oxygen

[SOURCE: EN 1839:2017, 3.7]

3.67
inerting
replacement of atmospheric oxygen in a system by a non-reactive, non-flammable gas, to make the atmosphere within the system unable to propagate flame

[SOURCE: CEN/TR 15281:2006, 3.1.1]

3.68
K_{max}, K_{St}
dust specific, volume independent characteristic which is calculated using the cubic law equation

$(dp/dt)_{max} \cdot V^{1/3}$ = const. = K_{St} = K_{max}

[SOURCE: EN 14034-2:2006+A1:2011, 3.8]

3.69
limiting oxygen concentration
LOC
maximum oxygen concentration in a mixture of a flammable substance or a combustible substance, air and an inert gas, in which an explosion will not occur

Note 1 to entry: LOC is usually expressed as molar fraction in % or volume fraction in %.

Note 2 to entry: The LOC does not depend only on the flammable gas, vapour or dust, but also on the inert gas used.

Note 3 to entry: LOC is calculated from the measured LAC.

3.70
liquid immersion "k"
type of protection where potential ignition sources are made ineffective or separated from the explosive atmosphere by either totally immersing them in a protective liquid, or by partially immersing and continuously coating their active surfaces with a protective liquid in such a way that an explosive atmosphere which may be above the liquid, or outside the equipment enclosure, cannot be ignited

[SOURCE: EN ISO 80079-37:2016, 3.4]

3.71
malfunction
situation where equipment or components do not perform their intended function with respect to explosion protection

Note 1 to entry: See also EN ISO 12100:2010.

Note 2 to entry: For the purposes of EN ISO 80079-36:2016[5] 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).

[SOURCE: EN ISO 80079-36:2016[5], 3.3.1, modified – "this standard" has been replaced with the standard reference]

3.71.1
expected malfunction
disturbances or equipment malfunction which normally occur in practice

[SOURCE: EN ISO 80079-36:2016[5], 3.3.2]

3.71.2
rare malfunction
type of malfunction which may happen, but only in rare instances.

Note 1 to entry: Two independent expected malfunctions which, separately, would not create a source of ignition, but which, in combination, do create a source of ignition, are regarded as a single rare malfunction.

Note 2 to entry: For example this includes two independent expected malfunctions which, separately, would not create a source of ignition but which, in combination, do create a source of ignition, are regarded as a single rare malfunction.

[SOURCE: EN IEC 60079-0:2018[1], 3.56.2]

3.72
maximum allowable explosion pressure
$p_{ex,max}$
maximum explosion pressure which the equipment will withstand

[SOURCE: EN 14460:2018, 3.2, modified - comma has been added between ex and max]

3.73
maximum surface temperature
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

Note 1 to entry: The maximum surface temperature is marked on the equipment and includes safety margins depending on the EPL of the equipment.

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

Note 3 to entry: For Ex Equipment in an explosive dust atmospheres, this temperature occurs on the external surface of the enclosure and may include a defined dust layer condition.

[SOURCE: EN ISO 80079-36:2016[5], 3.4, modified – verb has been added in Note 1 to entry]

3.74
maximum experimental safe gap
MESG
maximum gap of a joint of 25 mm in length which prevents any transmission of an explosion during tests made under the specified conditions.

Note 1 to entry: The conditions are specified in ISO/IEC 80079-20-1:2019.

Note 2 to entry: The definition refers only to gas explosions, as does the source standard.

[SOURCE: ISO/IEC 80079-20-1:2019, 3.4, modified – definition has been changed: “width” has been replaced with „length“, Note 1 to entry has been replaced and Note 2 to entry has been added]

3.75
maximum possible potential energy
maximum amount of energy which can be stored in equipment or in parts of equipment and can dissipate into kinetic energy during release

[SOURCE: EN ISO 80079-36:2016[5], 3.5]

3.76
mechanically generated sparks
sparks produced by mechanical impact or friction, burning particles, as well as showers of particles, produced by impact or friction between two solid materials

[SOURCE: EN ISO 80079-37:2016, 3.2, modified — comma added between friction and burning particles]

3.77
minimum ignition energy
MIE
lowest electrical energy stored in a capacitor which upon discharge is sufficient to effect ignition of the most ignitable atmosphere under specified test conditions

3.78
minimum ignition current
MIC
minimum current in a specified test circuit that causes the ignition of the explosive test mixture in the spark test apparatus according to EN 60079-11:2012

[SOURCE: EN ISO/IEC 80079-20-1:2019, 3.5, modified — publication date has been added]

3.79
mist
general term applied to a dispersion of droplets in a gas

Note 1 to entry: Mists can be produced by spraying or by other processes.

3.80
non-electrical equipment
equipment which can achieve its intended function mechanically

Note 1 to entry: Equipment addressed in EN ISO 80079-36:2016[5] can be driven by any kind of energy including electrical equipment (e.g. electrical motor driver for pump, turbine, fans, any electrical actuated items, electrical/electronics monitoring, sensors and control system whom requirements of, as single or combined electrical item, are supplemented by the EN IEC 60079 series of standards).

[SOURCE: EN ISO 80079-36:2016[5], 3.7, modified – Note 1 to entry has been modified with additional information]

3.81
normal operation
operation of equipment conforming to its design specification and used within the limits specified by the manufacturer

Note 1 to entry: 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 to entry: 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.

[SOURCE: EN ISO 80079-36:2016[5], 3.2]

3.82
oxidizer
air or an air/inert gas mixture (volume fraction of the oxygen < 21 %)

[SOURCE: EN 1839:2017, 3.12]

3.83
reduced explosion pressure
p_{red}
resulting explosion pressure generated by an explosion of an explosive atmosphere in an enclosure, after effective explosion venting or explosion suppression

Note 1 to entry: The term “explosion pressure” should only be used when the absolute pressure is meant.

Note 2 to entry: The term “reduced explosion overpressure” is used for explosion venting and for explosion suppression, e.g. in EN 14797, EN 14491 and EN 14373.

3.84
maximum reduced explosion overpressure
$p_{red,max}$
resulting maximum overpressure generated by an explosion of an explosive atmosphere in an enclosure at optimum fuel concentration, after effective explosion venting or explosion suppression

[SOURCE: EN 14491:2012, 3.12, modified – “vessel” in the definition has been replaced with “enclosure”]

3.85
release rate
quantity of flammable gas or vapour emitted per unit time from the source of release

[SOURCE: EN IEC 60079-10-1:2021, 3.4.5]

3.86
service temperature
T_s
maximum or minimum temperature reached at specific points of the equipment when the equipment is operating at rated conditions, including ambient temperature and any external sources of heating or cooling

Note 1 to entry: Equipment may reach different service temperatures in different parts.

[SOURCE: EN ISO 80079-36:2016[5], 3.8]

3.87
smouldering
combustion without light emission

[SOURCE: EN 17077:2018, 3.7]

3.88
static activation pressure
p_{stat}
differential pressure at which the retaining element activates such that the venting element is able to open

[SOURCE: EN 14491:2012, 3.15]

3.89
X
symbol used as a suffix to a certificate reference or marking (when no certificate exists) to denote special conditions for safe use

3.90
temperature class
temperature range used for:

— classification of equipment, protective system for explosive atmospheres based on its maximum temperature in contact with potentially explosive atmosphere

or

— classification of flammable gases and vapours based on their auto ignition

Note 1 to entry: Equipment classified into temperature classes can be used in explosive atmospheres generated by flammable gases and vapours of the same temperature class.

3.91
test mixture
mixture of test substance and air or air / inert gas

[SOURCE: EN 1839:2017, 3.15]

3.92
test substance
sample in the gaseous state; in the case of liquid samples, after complete evaporation

[SOURCE: EN 1839:2017, 3.14]

3.93
type of protection
specific measures applied to equipment to avoid ignition of a surrounding explosive atmosphere

Note 1 to entry: Equipment designed and constructed in accordance with EN ISO 80079-36:2016[5] for a particular EPL may be used in areas requiring an EPL with a higher level of safety by the application of additional measures. Such measures include for example inerting, suppression, venting or containment or for example by dilution, drainage, monitoring and shut-down. Such measures are outside the scope of EN ISO 80079-36:2016[5].

[SOURCE: EN ISO 80079-36:2016[5], 3.6, modified – “this standard” has been replaced with the standard reference]

3.94
vapour
gaseous phase emanating of being emanated from a liquid

[SOURCE: EN 1839:2017, 3.11, modified — Note 1 to entry has been deleted]

Annex A
(informative)

Definitions from Directive 2014/34/EU and corrigenda[8]

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

Atmosphere which could become explosive due to local and operational conditions.

A.3 Intended use

Use of equipment, protective systems, and devices in accordance with the equipment group and category as specified in Directive 2014/34/EU, Art. 2 (9), and taking into account all the information supplied by the manufacturer which is required for the safe functioning of equipment, protective systems, 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.4 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.5 Equipment group

A.5.1 General

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.

[8] These definitions are from Directive 2014/34/EU. The user is expected to check the latest version of the Directive for possible changes.

A.5.2 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 characterized by means of protection such that:

   1) either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection;

   2) or the requisite level of protection is ensured 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, expected malfunctions, and also in the case of more severe operating conditions, in particular those arising from rough handling and changing environmental conditions.

A.5.3 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 characterized by means of protection such that:

   1) either, in the event of failure of one mean of protection, at least an independent second means provides the requisite level of protection;

   2) or the requisite level of protection is ensured 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.6 Component

Item essential to the safe functioning of equipment and protective system but with no autonomous function

Annex B
(informative)

Significant changes between this document and EN 13237:2012

Table B.1 — Significant changes with respect to EN 13237:2012

		Type		
Significant changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Terms and definitions deleted	3		X	
New term air flow velocity	3.1		X	
Definition ambient temperature	3.3	X		
New term atmospheric conditions	3.4		X	
Definition combustible dust	3.5		X	
Definition conductive dust	3.5.1	X		
New term non-conductive dust	3.5.2		X	
New term combustible flyings	3.6		X	
New term constructional safety “c”	3.7		X	
New term control of ignition source “b”	3.8		X	
New term control measure	3.9		X	
New term automatic control measure	3.9.1		X	
New term manual control measure	3.9.2		X	
New term ignition prevention device ignition prevention system	3.10		X	
New term safety device	3.11		X	
Source updated continuous grade of release	3.12	X		
Source updated degree of protection	3.14	X		
Source specified detonation	3.15	X		
Note 1 to entry added: dust	3.16	X		

		Type		
Significant changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Source updated electrical equipment	3.17	X		
New term equipment grouping	3.20		X	
New term Ex Component	3.21		X	
New term explosion region	3.24		X	
Source updated explosion pressure	3.30	X		
Source updated maximum explosion pressure	3.30.1	X		
Source updated rate of explosion pressure rise	3.30.2	X		
Source updated maximum rate of explosion pressure rise	3.30.3	X		
Definition explosion suppression system	3.33	X		
New term explosive dust atmosphere	3.37		X	
Source added minimum ignition temperature of a dust cloud	3.38	x		
Source added minimum ignition temperature of a dust layer	3.39	x		
Definition, source added: minimum ignition energy (of a combustible dust/air mixture)	3.40		X	
New term flame arrester element	3.43		X	
Source updated gap of flameproof joint i	3.47.1	x		
Term updated: width of a flameproof joint L	3.47.2	X		
New term flammable substance combustible substance	3.52		x	
Source updated flash point	3.53		x	
New term flammable limits	3.54		X	
New term lower flammable limit	3.54.1		X	

		Type		
Significant changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
LFL				
New term upper flammable limit UFL	3.5.2		X	
New term gas	3.56		X	
New term gas explosion constant	3.57		X	
New term geometric vent area	3.58	x		
New term glowing	3.59		X	
hybrid mixture	3.60	x		
New term auto-ignition	3.61.1		x	
New term auto-ignition temperature	3.61.2	x		
New term ignition delay time	3.61.3		x	
New term ignition source scenarios	3.64	x		
Definition, all notes to entry: possible ignition source	3.64.1		X	
Source updated, Note 3 to entry updated equipment related ignition source	3.64.2	X		
Source changed, Definition, Notes to entry updated potential ignition source	3.64.3	X		
Source changed, Note 1 to entry added effective ignition source	3.64.4	x		
New term incendive sparks	3.65		X	
Definition, Source inert gas	3.66	X		
K_{max}, K_{st}	3.68	X		
Definition, Notes to entry added limiting oxygen concentration LOC	3.69		X	
New term liquid immersion “k”	3.70		X	
Definition, source changed rare malfunction	3.71.2		X	
New term maximum allowable explosion pressure	3.72		X	

		Type		
Significant changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Definition, Notes to entry, Source changed maximum experimental safe gap MESG	3.74		X	
New term maximum possible potential energy	3.75		X	
New term minimum ignition current	3.78		X	
Note 1 to entry added, Source added non-electrical equipment	3.80		X	
New term oxidizer	3.82		X	
Modified term reduced explosion pressure	3.83		X	
Definition maximum reduced explosion overpressure	3.84		X	
New term smouldering	3.87		X	
New term static activation pressure	3.88		X	
Definition symbol “X”	3.89		X	
Definition temperature class	3.90		X	
New term test mixture	3.91		X	
New term test substance	3.92		x	
Definition, Note 1 to entry added, Source changed type of protection	3.93		x	
Added references	Bibliography		x	

NOTE The technical changes referred to include the significant technical changes from the revised EN but is not an exhaustive list of all modifications from the previous version.

Explanations:

Minor and editorial changes: clarification
decrease of technical requirements
minor technical change
editorial corrections

Changes in a standard classified as ‘minor and editorial changes’ refer to changes regarding the previous standard, which modify requirements in an editorial or a minor technical way. In addition, changes of the

wording to clarify technical requirements without any technical change are classified as ‘minor and editorial changes’.

A reduction in the level of an existing requirement is also classified as a ‘minor and editorial change’.

Extension: addition of technical options

Changes in a standard classified as ‘extension’ refers to changes regarding the previous standard, which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. These ‘extensions’ will therefore not have to be considered for products in conformity with the preceding edition.

Major technical changes: addition of technical requirements

increase of technical requirements

Changes in a standard classified as ‘major technical change’ refer to changes regarding the previous standard, which add new or increase the level of existing technical requirements, in a way that a product in conformity with the previous standard will not always be able to fulfil the requirements given in the standard. ‘Major technical changes’ have to be considered for products in conformity with the previous edition.

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of Directive 2014/34/EU aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/596 to provide one voluntary means of conforming to essential requirements of Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2014/34/EU

Essential Requirements of Directive 2014/34/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Annex II	Clause 3, Annex A	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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[4] EN 14034-3:2006+A1:2011, *Determination of explosion characteristics of dust clouds - Part 3: Determination of the lower explosion limit LEL of dust clouds*

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[6] EN 14460:2018, *Explosion resistant equipment*

[7] EN 14491:2012, *Dust explosion venting protective systems*

[8] EN 14797:2006, *Explosion venting devices*

[9] EN 14983:2007, *Explosion prevention and protection in underground mines - Equipment and protective systems for firedamp drainage*

[10] EN 15089:2009, *Explosion isolation systems*

[11] EN 15198:2007, *Methodology for the risk assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres*

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[13] CEN/TR 15281:2006, *Guidance on Inerting for the Prevention of Explosions*

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[31] ISO 4225:2020, *Air quality — General aspects — Vocabulary*

[32] ISO 8421-1:1987, *Fire protection — Vocabulary — Part 1: General terms and phenomena of fire*

[33] Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres, OJ L 96, 29.3.2014, pp. 309-356

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