



BSI Standards Publication

Explosive atmospheres

Part 38: Equipment and components in explosive
atmospheres in underground mines

National foreword

This British Standard is the UK implementation of EN ISO/IEC 80079-38:2016+A1:2018. It is derived from ISO/IEC 80079-38:2016. It supersedes BS EN ISO/IEC 80079-38:2016, which is withdrawn.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 secretary.

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Amendments/corrigenda issued since publication

Date	Text affected
30 June 2018	Implementation of CEN amendment A1:2018: Annexes ZA and ZB replaced and Annex ZC deleted
31 August 2018	Implementation of CEN correction notice 13 June 2018: Annex ZA, Table ZA.1, row '1.3.1' expanded

English Version

**Explosive atmospheres - Part 38: Equipment and
components in explosive atmospheres in underground
mines (ISO/IEC 80079-38:2016)**

Atmosphères explosives - Partie 38: Appareils et
composants destinés à être utilisés dans les mines
souterraines grisouteuses (ISO/IEC 80079-38:2016)

Explosionsfähige Atmosphären - Teil 38: Geräte und
Komponenten in explosionsfähigen Atmosphären in
untertägigen Bergwerken (ISO/IEC 80079-38:2016)

This amendment A1 modifies the European Standard EN ISO/IEC 80079-38:2016; it was approved by CEN on 24 January 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO/IEC 80079-38:2016/A1:2018) has been prepared by Technical Committee ISO/TMBG "Technical Management Board - groups" in collaboration with Technical Committee CEN/TC 305 "Potentially explosive atmospheres - Explosion prevention and protection", the secretariat of which is held by DIN.

This Amendment to the European Standard EN ISO/IEC 80079:2018 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2018, and conflicting national standards shall be withdrawn at the latest by November 2018.

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 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 Annexes ZA and B, which is an integral part of this document.

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

Endorsement notice

The text of ISO/IEC 80079-38:2016 has been approved by CEN as EN ISO/IEC 80079-38:2016/A1:2018 without any modification.

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/BC/CEN/92/46 to provide one voluntary means of conforming to essential requirements of Directive 2014/34/EU "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 (recast)".

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

Requirement /EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
		General: To confer a presumption of conformity with the relevant essential requirements of Directive 2014/34/EU, this standard has to be applied together with at least with one of those standards as specified in this Column below
1.0.1	4; 5	EN ISO 80079-36
1.0.2	4; 5	
1.0.3	6.2; 6.3	
1.0.4	4.1; 5.1.2; 5.1.3	EN ISO 80079-36
1.0.5	8	EN ISO 80079-36
1.0.6	7.2	
1.1.1	4; 4.1; 5.3	EN ISO 80079-36, EN 60079-0
1.1.2	4.1; 4.3; 5.4; 5.5; 5.6; 5.7; 5.9	EN ISO 80079-36, EN 60079-0,
1.1.3	4.1	EN ISO 80079-36, EN 60079-0
1.2.1	4.1	
1.2.4	4	
1.2.5	4	
1.2.6	7.1	EN ISO 80079-36, EN 60079-0

Requirement /EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.2.7 a)	4.4; 5.3.1.7; 5.8	
1.2.7 b)	4.1; 4.2.3; 4.4.3.1; 5.4.2; 5.5; 5.6; 5.7; 5.9; 6.1; C.8; C.9; C.10	
1.2.7 c)	4.2; 6.2	EN ISO 80079-36
1.2.7 d)	4.4.3; 5.8	
1.2.8	4.1; 4.2; 4.3; 5.3.1.7; 5.4.1; 5.4.2; 5.4.6	
1.2.9	4.3; 4.4	EN ISO 80079-36
1.3.1	4.1; 4.2.3; 4.4.3.1; 5.1; 5.4.2; 5.4.3; 5.5; 5.6; 5.7; 6.1; 7.2	
1.3.2	4.1; 4.4.6.2; 5.3.2; 5.4.1; 5.4.5; 6.6; C.6	EN ISO 80079-36, EN 60079-0
1.3.3	4.1; 4.4.6; C.4; C.5	
1.3.4	5.3.1.7; 5.4.2	
1.4.1	4.4.5; 6.3; 7.2	instructions notice for limits of use
1.4.2	4.1; 7.2 C1, C.10; C.13	instructions notice for limits of use
1.5.1 to 1.5.8	5.4.1; 5.7.1; 5.8	EN ISO 80079-36
1.6.1 to 1.6.5	5.4.1	
2.0.2	4; 5	EN ISO 80079-36, EN 60079-0
2.0.2.1	4; 5	EN ISO 80079-36, EN 60079-0
2.0.2.2	7.1	

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.

Annex ZB

(informative)

Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/396 to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC "DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)".

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 2006/42/EC

Essential Requirements of Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.5.7	Whole standard	

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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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 38: Equipment and components in explosive atmospheres in underground mines

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard ISO/IEC 80079-38 has been prepared by subcommittee 31M: Non-electrical equipment and protective systems for explosive atmospheres, of IEC technical committee 31: Equipment for explosive atmospheres.

It is published as a double logo standard.

The text of this standard is based on the following documents of the IEC:

FDIS	Report on voting
31M/105/FDIS	31M/111/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by 13 P members out of 21 having cast a vote.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

"A list of all parts in the IEC 60079 series, under the general title *Explosive atmospheres*, as well as the International Standard 80079 series, can be found on the IEC website."

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This part of ISO/IEC 80079 specifies requirements for the constructional features of equipment and components that may be an individual item or form an assembly, to enable them to be used in mines, or parts of mines, susceptible to explosive atmospheres of firedamp and/or combustible dust.

Most of the electrical equipment used on mining machinery is certified as an individual item of equipment, e.g. the motor, switchgear etc., and meets its own marking requirements. This certification, however, does not deal with the interconnection of these items of equipment by cables or the machine electrical power system as an entity. The equipment and components, including their interconnections, should be assessed, from an ignition point of view, by the manufacturer.

Both non-electrical equipment and the interconnection of electrical/non-electrical equipment require an ignition hazard assessment.

Therefore, it is necessary that not just the equipment, but all its parts, is examined by the manufacturer according to a formally documented ignition hazard assessment that establishes and lists all the possible ignition sources of the equipment including the cables and electrical supply system. The documentation shall list the measures that shall be introduced to keep possible ignition sources from becoming effective.

The need for this International Standard arises because of major operational differences between underground mining operations and those in other industries working with, or in, explosive atmospheres. Examples of these differences are:

- the product being won from the underground strata may be combustible and may continually release firedamp during the winning process;
- the ignitability of the atmosphere around equipment and components usually depends upon the amount of dilution offered by an active ventilating system;
- the atmosphere in the general body of mine air in which machinery is working may change from one that is potentially explosive to one that is explosive (for example, during an outburst of firedamp);
- persons working in the mine are usually situated within the potentially explosive atmosphere;
- there is a need to monitor constantly the mine atmosphere at strategic places to ensure that power can be disconnected from all equipment except Ma equipment which is suitable for use in a constantly explosive atmosphere;
- in gassy coal mines, an explosion of firedamp at a machine can raise a combustible dust cloud that exacerbates the explosion;
- some mining machinery, especially that associated with winning the product, contains cutting devices and drilling devices that are intended to cut into the combustible product as part of their normal operation. This introduces an ignition risk from frictional heating or frictional sparking from contact with strata containing high concentrations of quartz or iron pyrites;
- long roadways in coal mines are equipped with mineral conveying systems carrying a product that has a potential for raising a combustible dust cloud and the production of firedamp.

To decide which equipment or its component parts should merit inclusion in this International Standard, ignition data has been examined based on international experience.

When drafting this International standard, it has been assumed that equipment and components are:

- designed in accordance with good engineering practice, taking account of expected shocks, vibrations and failure modes;
- of sound mechanical and electrical construction;
- made of materials with adequate strength and of suitable quality;
- free from defects; and
- kept in good repair and working order, e.g. so that the required dimensions remain within permissible tolerance despite wear.

EXPLOSIVE ATMOSPHERES –

Part 38: Equipment and components in explosive atmospheres in underground mines

1 Scope

This part of ISO/IEC 80079 specifies the explosion protection requirements for the design, construction, assessment and information for use (maintenance, repair, marking) of equipment that may be an individual item or form an assembly.

This includes machinery and components for use in mines susceptible to explosive atmospheres of firedamp and/or combustible dust. The standard atmospheric conditions (relating to the explosion characteristics of the atmosphere) under which it may be assumed that equipment can be operated are:

- temperature -20 °C to +60 °C;
- pressure 80 kPa (0,8 bar) to 110 kPa (1,1 bar); and
- air with normal oxygen content, typically 21 % v/v.

This part of ISO/IEC 80079 applies for equipment and components according to EPL Mb to be used in explosive atmospheres containing firedamp and/or combustible dust.

NOTE 1 In some countries, there might be differences according to the classification, e.g. Mb is similar to category M2 in the European Union.

For equipment and components according to EPL Ma, the requirements of this standard and of ISO 80079-36 and IEC 60079-0 apply.

NOTE 2 A standard with additional requirements for EPL Ma is under preparation.

It is necessary to take account of external conditions to the equipment which may affect the hazard and the resultant protection measures. These measures may include ventilation, gas detection or gas drainage.

This part of ISO/IEC 80079 also deals with the prevention of ignitions of explosive atmospheres caused by burning (or smouldering) of combustible material such as fabric fibres, plastic "O"-rings, rubber seals, lubricating oils or greases used in the construction of the equipment if such items could be an ignition source. For example, the mechanical failure of rotating shaft bearings can result in frictional heating that ignites its plastic cage, plastic seal or lubricating grease.

Detailed requirements and test procedures for the fire protection of conveyer belts are not part of this part of ISO/IEC 80079.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-25, *Explosive atmospheres – Part 25: Intrinsically safe electrical systems*

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60204-11, *Safety of machinery – Electrical equipment of machines – Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not exceeding 36 kV*

IEC 60332-1 (all parts), *Tests on electric and optical fibre cables under fire conditions*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

ISO 340, *Conveyor belts – Laboratory scale flammability characteristics – Requirements and test method*

ISO 630-5, *Structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

ISO 1940-1, *Mechanical vibration – Balance quality requirements for rotors in a constant (rigid) state – Part 1: Specification and verification of balance tolerances*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO 13849-1, *Safety of Machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 14916, *Thermal spraying – Determination of tensile adhesive strength*

ISO 14935, *Petroleum and related products – Determination of wick flame persistence of fire-resistant fluids*

ISO 15029-1, *Petroleum and related products – Determination of spray ignition characteristics of fire-resistant fluids – Part 1: Spray flame persistence – Hollow-cone nozzle method*

ISO/TS 15029-2, *Petroleum and related products – Determination of spray ignition characteristics of fire-resistant fluids – Part 2: Spray test – Stabilized flame heat release method*

ISO 80079-36:2016, *Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements*

ISO 80079-37:2016, *Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non-electrical type of protection constructional safety ‘c’, control of ignition sources ‘b’, liquid immersion ‘k’*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 60079-0, ISO/IEC 80079-36, ISO/IEC 80079-37 and the following apply.

3.1

firedamp

flammable mixture of gases naturally occurring in a mine

Note 1 to entry: As firedamp consists mainly of methane, the terms firedamp and methane are used frequently in mining practice as synonyms.

[SOURCE: IEC 60079-0:2011, 3.34, Note modified]

3.2

protection against firedamp explosions

explosion prevention and protection in underground parts of mines and those parts of surface installations of such mines liable to be endangered by firedamp and or flammable dust

3.3

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

3.4

component

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

3.5

equipment

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

[SOURCE: ISO/IEC 80079-36:2016, 3.10]

3.6

explosion

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

[SOURCE: IEC 60050-426:2008, 426-02-13, modified, (removal of "(of an explosive atmosphere)" from the title)]

3.7

explosive atmosphere

mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour, dust, fibres, or flyings which, after ignition, permits self-sustaining propagation

[SOURCE: IEC 60079-0:2011, 3.30]

3.8

intended use

use of equipment, protective systems and devices in accordance with the equipment group and equipment protection level (EPL), and taking into account all the information supplied by the manufacturer which is required for the safe functioning of equipment, protective systems and devices

3.9

machinery

assembly, fitted with or intended to be fitted with a drive system consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application

Note 1 to entry: The term "machinery" also covers an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole.

[SOURCE: ISO 12100]

3.10

malfunction

equipment or components which do not perform their intended function with respect to explosion protection

Note 1 to entry: For the purposes of this standard this can happen due to a variety of reasons, including

- failure of one (or more) of the component parts of the equipment or 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: IEC 60079-0:2011, 3.41]

3.11

minimum ignition energy

MIE

lowest stored energy which upon discharge is sufficient to effect ignition of the most ignitable atmosphere under specified test conditions

3.12

potentially explosive atmosphere

atmosphere which could become explosive due to local and operational conditions

3.13

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

3.14

equipment protection level

EPL

level of protection 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 and/or combustible dust

Note 1 to entry: The equipment protection level may optionally be employed as part of a complete risk assessment of an installation.

[SOURCE: IEC 60079-0:2011, 3.26, modified (addition of "combustible dust" and removal of the reference to IEC 60079-14 in the note)]

3.15

EPL Ma

equipment for installation in a mine susceptible to firedamp and/or combustible dust, having a "very high" level of protection, which has sufficient security that it is unlikely to become an