BRITISH STANDARD

BS EN
13463-3:2005

Non-electrical equipment for use in potentially explosive atmospheres —

Part 3: Protection by flameproof enclosure ‘d’

The European Standard EN 13463-3:2005 has the status of a British Standard

ICS 13.230

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13463-3:2005.

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 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.

Additional information

This standard was prepared by CEN/TC 305/WG 2, Equipment for use in potentially explosive atmospheres, and, in accordance with their general policy, it is written to be applicable to all potentially explosive atmospheres whether arising from gas, vapour or dust.

Flameproof enclosures for non-electrical equipment are most likely to be useful, however, in applications where the equipment may be exposed to explosive gas atmospheres, including applications where the exposure is to both gas and dust atmospheres and where the user wants equipment suitable for either type of service.

In applications where the equipment may be exposed to explosive dust atmospheres only, other, simpler, enclosures, which provide a suitable ingress protection, are likely to be more effective. See BS EN 13463-5:2003 *Non-electrical equipment for potentially explosive atmospheres. Protection by constructional safety 'c'.*

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.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 18, an inside back cover and a back cover.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 18 November 2005

ISBN 0 580 46745 7

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13463-3

April 2005

ICS 13.230

English version

Non-electrical equipment for use in potentially explosive atmospheres - Part 3: Protection by flameproof enclosure 'd'

Appareils non électriques destinés à être utilisés en atmosphères explosibles - Partie 3 : protection par enveloppe antidéflagrante 'd'

Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 3: Schutz durch druckfeste Kapselung 'd'

This European Standard was approved by CEN on 15 March 2005.

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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 Central Secretariat has the same status as the official versions.

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Ref. No. EN 13463-3:2005: E

Contents

Foreword

This document (EN 13463-3:2005) 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 October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

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 94/4EC of 23 March 1994.

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

This document is to specify the requirements for the type of protection “Protection by flameproof enclosure” for equipment intended for use in potentially explosive atmospheres and should be used in conjunction with EN 13463-1 "Non-electrical equipment for potentially explosive atmospheres – Basic method and requirements".

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

Introduction

Some types of non-electrical equipment intended for use in potentially explosive atmospheres of gas, vapour, mist and/or combustible dust, contain effective ignition sources in normal operation and these have to be prevented from becoming an ignition source for the surrounding atmosphere in which they are used. One way of achieving this is to enclose the ignition sources so that an ignition of the atmosphere inside the enclosure is not transmitted to the outside atmosphere. This document describes one such way, known as protection by "Flameproof enclosure 'd'".

The basic principle of ignition protection by the use of a flameproof enclosure, is that gases, or vapour, may enter the enclosure through the cover joints / flanges and if an explosive atmosphere inside the enclosure ignites, neither the enclosure will be deformed significantly, nor flame transmitted through the joints / flanges to the explosive atmosphere outside. For this reason the enclosure has to be both robust and have dimensionally controlled cover joints / flanges with maximum allowable safe gaps appropriate for the types of explosive gas / vapour likely to occur inside the equipment.

Since its conception, protection by flameproof enclosure has been developed to allow many kinds of continuously sparking equipment to be used safely in places where a potentially explosive atmosphere exists. For electrical equipment, this type of protection is well known for protecting power arcing components and is defined and described in EN 60079-1. As the electrical equipment standard contains the generic testing, verification and marking requirements, unnecessary duplication of the requirements in this non-electrical equipment document is avoided by cross reference to the electrical standard. In this document, only those differences necessary for the purpose of providing protection for non-electrical equipment are written in full.

In contrast to this document EN 60079-1 does not consider explosive atmospheres formed by dusts, except for Group I, category M2 electrical equipment, where its associated general requirements document, EN 60079-0, states that flameproof equipment designed, constructed and tested for use in explosive atmospheres of firedamp (explosive mine gas consisting mainly of methane) needs no alteration, or further testing to allow it to be used where a coal dust cloud is present.

The concept of protecting equipment against dust cloud ignition by testing it in a gas / air mixture is also accepted in this document for both Group I, Category M2 mining equipment, and Group II, Category 2G and 2D non-mining equipment. This is because it introduces an acceptable safety factor against ignition and it allows a much more simple method of testing and verifying its explosion protection properties.

Examples of non-electrical types of equipment that can be protected by flameproof enclosure are:

a) Equipment with potentially hot rubbing surfaces exceeding the ignition temperature of the atmosphere surrounding them, e.g. friction clutches and brake linings

b) equipment that has to operate at high temperature to function correctly, such as catalytic converters in the exhaust systems of flameproof internal combustion engines, or hot catalytic pellistors used in the sensors of flammable gas measuring instruments,

c) equipment producing incendive frictional sparks in normal operation.

Little equipment is currently made to flameproof designs for dust applications, because alternative designs using dust tight enclosures are usually cheaper. There are however non-mining applications where both dust and gas are present, where this document may be applicable.

Where dust alone is present, there is usually no mechanism to create inside an enclosure an explosive dust cloud, although deposits of dust may form. The risk from a fire involving dust deposits inside the enclosure is not considered by this document, as it falls outside the concept of protection by flameproof enclosure.

1 Scope

This document specifies the requirements for the design, assessment, construction and testing of equipment intended for use in potentially explosive gas or dust atmospheres, protected by the type of protection: Flameproof enclosure "d".

This document supplements the requirements in EN 13463-1, the contents of which also apply in full to equipment constructed to this document. Equipment complying with the relevant clauses of this document meets the requirements for the following categories:

— Equipment Group I Category M2 – that does not contain an ignition source arising from severe operating conditions, in particular arising from rough handling and changing environmental conditions;

— Equipment Group II Category 2G or 2D – that does not contain an ignition source arising as a result of foreseeable malfunctions.

The type of ignition protection described in the document can be used either on its own or in combination with other types of ignition protection to meet the requirements for equipment of Group I categories M2, or Group II categories 1 and 2 depending on the ignition hazard assessment in EN 13463-1.

NOTE The requirements for Group I Category M1 equipment are given in EN 50303, which specifies the requirements for both electrical and non-electrical equipment.

This document shall not be used for equipment intended for use in sulphur dust and organic peroxides because of the difficulty of testing and specifying the requirements

This document does not apply to the ignition protection of electrical equipment, or reciprocating internal combustion engines. For these requirements reference shall be made to EN 60079-0 and EN 60079-1 for electrical equipment and EN 1834-1, -2 and -3 for reciprocation internal combustion engines.

2 Normative references

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

EN 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 13463-1:2001, *Non-electrical equipment for potentially explosive atmospheres — Part 1: Basic method and requirements.*

EN 60079-0:2004, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*.

EN 60079-1:2004, *Electrical apparatus for potentially explosive atmospheres — Part 1: Flameproof enclosure 'd'*.

3 Terms and Definitions

For the purposes of this document, the terms and definitions given in EN 1127-1:1997, EN 1127-2:2002, EN 13463-1:2001, EN 60079-0:2004 and EN 60079-1:2004 and the following apply.

3.1
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.

[EN 13237:2003]

4 Determination of suitability and general requirements

4.1 Determination of suitability

Before a decision is made to protect equipment, or pieces of equipment for use as an assembly, including interconnecting parts, by measures described in this document, it shall be subjected to the ignition hazard assessment in accordance with EN 13463-1. Furthermore, this assessment shall determine that protection by flameproof enclosure ‘d’ is appropriate for the type of potential ignition source in the equipment and capable of achieving the level of protection required by the Group and Category to which the equipment is to be constructed.

The equipment grouping and temperature classification defined in EN 13463-1 apply.

The subdivisions of the gas Group IIA, IIB and IIC described in EN 60079-0 (which refer to equipment atmospheres of different gases or vapours) also apply to the requirements for Group II equipment in this document.

4.2 General requirements

All references to EN 60079-0 in EN 60079-1 shall additionally be taken as a reference to EN 13463-1 and where conflict occurs, EN 13463-1 shall take precedence.

5 Flameproof joints

Flameproof joints shall conform to EN 60079-1:2004, Clause 5 which includes tables of the required maximum gap for different gas groups.

The following modifications shall apply hereby:

a) In EN 60079-1:2004, Clause 5 reference to the word “electrical” shall be replaced by “non-electrical” and the word “apparatus” shall be replaced by “equipment”.

b) EN 60079-1:2004, 5.1 shall be replaced by the following:

“When tested in accordance with 15.1 (Ability of the enclosure to withstand the pressure of an internal explosion), the enclosure shall not suffer permanent deformation or damage, which reduces the level of ignition protection provided by the enclosure to an unsatisfactory level. That is, by either weakening the mechanical strength / robustness of the enclosure, or by enlarging the width of any flameproof joint."

"When tested in accordance with 15.2 (Ability of the enclosure joints to prevent flame transmission), the enclosure shall not transmit an incendive flame through its flameproof joints.”

All flameproof joints, whether permanently closed or designed to be opened from time to time, shall comply, in the absence of pressure, with the requirements of Clause 5.

NOTE The values given in Clause 5 constitute the necessary conditions. Additional measures can be necessary in order to pass the non-transmission test of 15.2.

The surface of joints may be protected against corrosion

Coating with paint is not permitted. Other coating material may be used if the material and application procedure have been shown not to adversely affect the flameproof properties of the joint.“

6 Cemented joints

Cemented joints shall conform to EN 60079-1.

7 Operating rods

Operating rods shall conform to EN 60079-1.

8 Supplementary requirements for shafts and bearings

Shafts and bearings shall conform to EN 60079-1:2004, Clause 8.

The following modification shall apply hereby:

The word “electrical” in EN 60079-1:2004, 8.1 and 8.2 and in EN 60079-1:2004, Figures 17, 18, 19 and 20 shall be replaced by “non-electrical”.

9 Light transmitting parts

Light transmitting parts shall conform to EN 60079-1 for inspection windows and for sight glasses forming part of a non-electrical equipment enclosure.

The following modification shall apply hereby:

The reference to EN 60079-0 in EN 60079-1 shall be treated as being a reference to EN 13463-1.

10 Breathing and draining devices which form part of a flameproof enclosure

Breathing and draining devices which form part of a flameproof enclosure shall conform to EN 60079-1.

The following modification shall apply hereby:

The reference to EN 60079-0 in EN 60079-1 shall be treated as being a reference to EN 13463-1.

11 Fasteners, associated holes and closing devices

Fasteners, associated holes and closing devices shall conform to EN 60079-1.

The following modification shall apply hereby:

The words “cable gland or conduit entry” in EN 60079-1:2004, 11.9 shall be treated as including pipe entries and similar openings in non-electrical equipment that need to be closed for the protection to be effective.

12 Materials and mechanical strength of enclosures; materials inside the enclosure

Materials and mechanical strength of enclosures; materials inside the enclosure shall conform to EN 60079-1.

The following modification shall apply hereby:

EN 60079-1:2004, 12.6 (CTI of electrical insulating material), which is not relevant to non-electrical equipment shall be disregarded.

13 Entries for flameproof enclosures

Although it is unlikely that an equivalent to the electrical barrier type cable entry exists for non-electrical equipment, the requirements of EN 60079-1:2004, Clause 13 and the tests described in EN 60079-1:2004, Annex C, shall be applied if similar types of non-electrical enclosure entry devices are used.

Non-electrical plug and socket entries to flameproof enclosures shall comply with EN 60079-1:2004, 13.3.1 and shall bear a label warning: “DO NOT SEPARATE WHEN EQUIPMENT IS OPERATING”.

The following modification shall apply hereby:

EN 60079-1:2004, 13.3.2 and 13.3.3 shall be disregarded, because they are not relevant to non-electrical equipment.

Entries for flameproof enclosures shall conform to EN 60079-1:2004, 13.4, for bushings between flameproof equipment enclosure walls.

The following modifications shall apply hereby:

a) 1) “Conductors” shall be treated as any solid material / strand passing through the enclosure wall by means of a bushing. For example, a fibre optic core passing through an internal wall (via a bushing) to transmit light from one compartment to another;

b) 2) reference to EN 60079-0 in EN 60079-1:2004, 13.4.2 shall be treated as a reference to EN 13463-1;

c) 3) “electrical apparatus” in EN 60079-1:2004, 13.4.4 shall be treated as “non-electrical apparatus”.

14 Verification and tests

The requirements in EN 60079-1:2004, Clause 14 do not apply to non-electrical equipment because it deals with the determination of maximum surface temperature of certain kinds of electrical equipment and is not therefore applicable.

15 Type tests

NOTE As this document has a wider scope than EN 60079-1, by dealing with equipment intended for use in potentially explosive atmospheres of combustible dust, additional clauses have been added to the existing clauses of EN 60079-1 (which only deal with the testing of equipment intended for use in potentially explosive gas atmospheres. See 15.2 below.

15.1 Type testing of flameproof non-electrical equipment for explosive gas or vapour/air mixtures

Flameproof non-electrical equipment for explosive gas or vapour/air mixtures fulfil the requirements of EN 60079-1:2004, Clause 15 in so far as they relate to the type testing of equipment intended for use in gases and vapours. All reference to EN 60079-0 in EN 60079-1 shall be treated as reference to EN 13463-1.

NOTE Based on the findings of several EU member state laboratories, Dr. G. A. Lunn concluded in his literature survey report of 24 June 1997, HSE Health & Safety Laboratory Report reference SM/97/01 – ”The use of flameproof enclosures in coal dust and methane atmospheres”, that mining flameproof equipment with joints of less than 1mm width and 3 mm length were unlikely to permit propagation of coal dust deposit combustion from inside the enclosure to outside. Thus, by referring to the maximum gap width and minimum flamepath length for methane, as specified in Table 2 of EN 60079-1:2004, it can be seen that flameproof equipment tested in methane is also adequately safe for use in combustible coal dust atmospheres. This report was subsequently expanded to include work by Dr. P. Tolson on the acceptability of gas tested intrinsically safe equipment in combustible coal dust atmospheres and was published as transaction paper – “Trans. Inst. Min. Metall (Sect A: Min. industry) No. 108 by the UK Institution of Mining Engineers in April 1999, entitled “Electrical ignitions and use of flameproof enclosures in coal-dust and methane atmospheres”.

15.2 Type testing of non-electrical electrical equipment for explosive gas or vapour/air mixtures

Enclosures intended for use in a potentially explosive atmosphere of combustible dust (other than those mentioned in Clause 1 of this document), shall:

a) be tested according to 15.1 above using an explosive gas/air mixture for Group IIA, equipment, and

b) withstand the pressure and meet the flame transmission prevention requirements for Group IIA equipment.

NOTE Ignition protecting non-electrical equipment intended for use in potentially explosive atmospheres of combustible dust alone by the use of a flameproof enclosure ‘d’, as described in this document, is not normally practiced. This is because an equivalent level of ignition protection can usually be achieved by a simpler and more economically constructed dust proof enclosure. (e.g. a robust enclosure with simple joints having a solid matter ingress protection rating of IP6X as described in the IP Code EN 60529). This prevents combustible dust entering the enclosures and therefore prevents an explosive dust cloud forming inside it.

16 Routine tests

Routine tests shall conform to EN 60079-1:2004, Clause 16 (performance of a routine pressure test on each enclosure).

17 Switchgear

The requirements of EN 60079-1:2004, Clause 17 deal with electrical switchgear and are not applicable to non-electrical equipment.

18 Lampholders and lampcaps

The requirements of EN 60079-1:2004, Clause 18 deal with lampholders and lampcaps and are not applicable to non-electrical equipment.

19 Non-metallic enclosures and non-metallic parts of enclosures

Non-metallic enclosures and non-metallic parts of enclosures shall conform to EN 60079-1.

20 Apparatus using capillaries

Apparatus using capillaries shall conform to EN 60079-1:2004, 5.5.

21 Instructions and documentation

21.1 User instructions

Equipment conforming to the requirements of this document shall be accompanied by user instructions as required by EN 13463-1 and additionally:

a) If necessary, any specific mounting instructions for the equipment;

b) instructions relating to maintenance of the enclosure and its recommended duty life;

c) if necessary to prevent corrosion of flameproof joint surfaces, a description of the type(s) of compounds that may be applied to the joint surfaces without affecting the level of ignition protection offered by them (see EN 60079-1:2004, 5.1, as cross-referred to in this document);

d) a warning about the avoidance of pressure piling, that can occur if unrestricted pipe connections are made between separate flameproof enclosures;

e) a warning that the equipment is not suitable for use in sulphur dust, or organic peroxide dust, atmospheres.

21.2 Technical documentation

Technical documentation to demonstrate compliance with the document shall contain the user instructions and the following technical documentation:

a) Object and use purpose;

b) desired type of protection, temperature class and relevant standards;

c) type label with explanation;

d) function;

e) the maximum allowable component and/or material temperature – materials and its correct characteristics; for example a copy of the complete reference of any non-metallic material used in the manufacture of the enclosure or parts with statement of the selection criteria and where appropriate the test report;

f) variants;

g) mounting instructions;

h) main drawing, total view, sections drawing and additional documentation;

i) the requirements of routine testing, the results of any calculations, table of gaps, table of cemented joints, inclusive material, maximum temperature, where appropriate temperature test report, test report IP XX;

j) a copy of the test report indicating the explosion test pressure obtained and compliance with the pass requirements for the type test(s) described in 15.1 and 15.2 of this document. Otherwise, a statement describing why the test was not necessary for the type of equipment concerned (e.g. too small a volume).

NOTE It is intended to revise EN 13463-1 to include requirements for technical documentation.

22 Marking

In addition to the marking requirements of EN 13463-1, the specific marking necessary for compliance with this part of this document shall include the symbol 'd' (designating the type of explosion protection).

Example of the marking in relation to the explosion protection for Group II, Category 2 with a temperature class of T 4 equipment, intended for use in a potentially explosive atmosphere of gas:

II 2 G d T4

Example of the marking in relation to the explosion protection for Group I, Category M2 equipment:

I M2 d

Annex A
(normative)

Additional requirements for crimped ribbon elements of breathing and draining devices

Crimped ribbon elements of breathing and draining devices shall conform to EN 60079-1:2004, Annex A.

Annex B
(normative)

Additional requirements for elements, with non-measurable paths, of breathing and draining devices

Elements with non-measurable paths of breathing and draining devices shall conform to EN 60079-1:2004, Annex B.

Annex C
(normative)

Additional requirements for flameproof entries

The requirements of EN 60079-1:2004, Annex C for cable entries to enclosures do not apply. The test method and pass/fail requirements given EN 60079-1:2004, Annex C shall be used to test the pressure resistance of compression-type-pipe-entries to non-electrical equipment enclosures. To perform this test the hollow pipe through the compression type entry shall be replaced by a solid rod / mandrel.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 94/9/EC

This European standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 94/9/EC of 23 March 1993 concerning equipment and protective systems intended for use in potentially explosive atmospheres.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in table ZA 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.

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

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

Essential Requirements (ERs) of EU Directive 94/9/EC		Clauses of this EN	Reference in other standards
1	**Common Requirements**		
1.0.1	Principles of integrated explosion safety	Clause 4	
1.0.2	Design considerations, take account of faults/misuse	Clauses 4, 8 and 15	
1.0.3	Special checking and maintenance conditions	Clause 4	
1.0.4	Foreseeable area conditions	Clause 4	
1.0.5	Marking	Clause 22	
1.0.6	Manufacturer's instructions	Clause 21	
1.1	Selection of materials		
1.1.1	Must not trigger an explosion	Clause 4	
1.1.2	Limits of operation	Clause 5	
1.1.3	Effects on predictable changes in materials characteristics	Clauses 15 and 16	
1.2	Design and construction		
1.2.1	State of the art design of explosion protection	Clause 4	
1.2.2	Safe functioning of replacement components	Clause 4	
1.2.3	Enclosed structures and prevention of leaks	Clauses 4, 5, 15 and 16	
1.2.4	Safety with dust deposits	Clause 4 and 15.2	
1.2.5	Additional means of protection for external stresses		Dealt with in EN 13463-1 (impact and drop tests)
1.2.6	Safe opening		Dealt with in EN 13463-1

Table ZA.1 *(continued)*

Essential Requirements (ERs) of EU Directive 94/9/EC		Clauses of this EN	Reference in other standards
1.2.7	Other hazards		
a)	Electrical dangers,		The danger of skin burns and electric shock are not dealt with in the explosion protection standards
b)	Surface temperatures		Dealt with in EN 13463-1
c)	Non-electrical dangers		Dealt with in EN 13463-1
1.2.8	Overloading of equipment, control devices, power limitation.	Overloading is not specifically dealt with	.
1.2.9	Flameproof enclosure systems	All clauses of this standard	
1.3	Prevention of potential ignition sources		
1.3.1	Hazards arising from hot surfaces and mechanical sparks.	Clauses 4, 5, 6, 7, 8	Dealt with in EN 13463-1
1.3.2	Hazards arising from static electricity		Dealt with in EN 13463-1
1.3.3	Hazards arising from stray electric and leakage currents		Not dealt with in this standard
1.3.4	Hazards arising from overheating		Dealt with in EN 13463-1
1.3.5	Hazards arising from pressure compensation operations or shock waves.		Not dealt with in this standard, other than by reducing the effects of pressure piling in enclosures with interconnected compartments
1.4	Hazards rising from external effects		
1.4.1	Safe functioning		Pollutants are not dealt with in this standard. Other external effects are the subject of agreement between the manufacturer and user.
1.4.2	Mechanical and thermal stresses and withstanding attack by existing or on foreseeable aggressive substances	Resistance to chemical attack is subject to agreement between the manufacturer and user.	
1.5	Requirements in respect of safety-related devices		
1.5.1 to 1.5.8	Safety Related Devices are not intended to be within the scope of this standard		
1.6	Integration of safety requirements relating to the system		
1.6.1 to 1.6.5	Integrated systems are not intended to be within the scope of this standard		

Table ZA.1 *(continued)*

Essential Requirements (ERs) of EU Directive 94/9/EC		Clauses of this EN	Reference in other standards
2.0	**Supplementary requirements in respect of equipment**		
2.0.1	Requirements for Group I category M1 Equipment		
2.0.1.1	Source of ignition not to become active		Group I (Mining) Category M1 equipment is dealt with in EN 50303. This standard is relevant if protection type 'd' provides one of the two ignition protection means required.
2.0.1.3	Surface temperature to be below ignition temperature to prevent the ignition of suspend dust		Group I (Mining) Category M1 equipment is dealt with in EN 50303. This standard is relevant if protection type 'd' provides one of the two ignition protection means required.
2.0.1.4	Avoidance of opening of equipment with sources of ignition		Group I (Mining) Category M1 equipment is dealt with in EN 50303. This standard is relevant if protection type 'd' provides one of the two ignition protection means required.
2.0.2	Requirements for Group I category M 2 equipment		
2.0.2.1	Sources of ignition not to become active in normal operation	Clause 4	
2.0.2.2	Opening of equipment only under non-active conditions		Not covered
2.0.2.3	Requirement for explosion hazards from dust category M1	Clause 5 and 15.2	
2.1	Requirements for Group II category 1 equipment		
2.1.1	Explosive atmospheres caused by gases, vapours or hazes	All clauses of this standard	
2.1.1.1	Sources of ignition not to become active in normal operation	Clause 4	
2.1.1.2	Surface temperatures not exceeded	Clause 4	
2.1.1.3	Opening of equipment only under non-active conditions	Clause 4	
2.1.2	Surface temperatures to be kept below ignition temperatures of suspended dust	Clause 4	
2.1.2.4	Opening of equipment only under non-active conditions	Clause 4	

Table ZA.1 *(concluded)*

Essential Safety Requirement		Clauses of this EN	Reference in other standards
2.2	Requirements for Group II category 2 equipment		
2.2.1	Explosive atmospheres caused by gases, vapours or mists	Clause 4	
2.2.1.1.	Design and construction of equipment to prevent ignition sources arising	Clause 4	
2.2.1.2	Design and construction of equipment so that surface temperatures is not exceeded	Clause 4	
2.2.1.3	Design of equipment for operating under non-active conditions/interlocking systems		Not covered
2.2.2.1	Design and protection of equipment to prevent sources of dust ignition becoming active	Clause 4	
2.2.2.2	Stated max. surface temperatures not to be exceeded, no dust penetration	Clause 5	
2.3	Requirements for Group II category 3 equipment		
2.3.1.1	Design and construction of equipment to prevent foreseeable ignition of gas or mist during normal operation	All clauses of this standard	
2.3.1.2	Surface temperatures not to exceed stated figures	Clause 8	EN 13463-1 (temperature limitation)
2.3.1.3	Explosive atmospheres caused by air/dust mixtures		
	Design and construction of equipment to prevent ignition of air/dust mixtures during normal operation	Clauses 5 and 15	
2.3.2.3	Prevention of dust particles mixing with air in equipment to cause ignition inside the equipment.	Clauses 4, 5 and 15	
3	**Requirements for 'Protective Systems'**		
	Protective systems are not within the scope of this standard.		

Bibliography

EN 1834-1, *Reciprocating internal combustion engines — Safety requirements for design and construction of engines for use in potentially explosive atmospheres — Part 1: Group II engines for use in flammable gas and vapour atmospheres.*

EN 1834-2, *Reciprocating internal combustion engines — Safety requirements for design and construction of engines for use in potentially explosive atmospheres — Part 2: Group I engines for use in underground workings susceptible to firedamp and/or combustible dust.*

EN 1834-3*, Reciprocating internal combustion engines — Safety requirements for design and construction of engines for use in potentially explosive atmospheres — Part 3: Group II engines for use in flammable dust atmospheres.*

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

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

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*.

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