

Group I, Category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust

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

Appareils du groupe I de catégorie M1
destinés à rester en opération dans les
atmosphères exposées au grisou et/ou à
la poussière de charbon

Gruppe I, Kategorie M1 Geräte
für den Einsatz in Atmosphären,
die durch Grubengas und/oder
brennbare Stäube gefährdet sind

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Standard was prepared jointly by Working Group 16 of the Technical Committee CENELEC TC 31 and Working Group 2 of the Technical Committee CEN TC 305 to implement the mandate given to CEN and CENELEC by the European Commission and the European Free Trade Association to set down requirements for the design and construction of equipment in support of the essential safety and health requirements described in annex I, clause 1 and annex II, clause 2.0.1 of the European Article 100A Directive 94/9/EC, Equipment and Protective Systems intended for Use in Potentially Explosive Atmospheres.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50303 on 2000-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2001-04-01
 - latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-06-30
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Introduction

Before the coming into force of the European Directive 94/9/EC, no European Standard existed for the types of equipment intended for continued use in explosive atmospheres of firedamp and/or coal dust in the underground workings, or surface installations, of mines. Most Member State Governments however, had national legislation based on the guidelines of the European Safety and Health Commission for Mining and Other Extractive Industries adopted in Luxembourg during 1986.

These guidelines recommended that the kinds of equipment allowed to remain functional in atmospheres endangered by firedamp and/or coal dust, should be restricted to those which were necessary for the protection of workers and safe with more than one fault applied. With the coming into force of 94/9/EC the fundamental constructional requirements for these kinds of equipment were included in the annexes I and II of the Directive and designated Group I Category M1 Equipment.

This standard is based on these requirements and although it makes reference to other (Category M2) explosion protection standards, it is a “stand alone” document relating to both electrical and non-electrical equipment intended to remain functional in explosive atmospheres of firedamp and/or coal dust.

1 Scope

1.1 This standard specifies the design, construction, testing and marking requirements for Group I, Category M1 equipment intended to remain functional in underground parts of mines, as well as those parts of surface installations of such mines endangered by firedamp and/or coal dust clouds under normal atmospheric conditions of pressures ranging from 0,8 bar to 1,1 bar and temperatures ranging from -20 °C to +60 °C.

1.2 It applies to all electrical and non-electrical equipment capable of causing an explosion through its own potential source of ignition.

1.3 It also applies to cables, pipes and optical fibres, when such items are used to carry energy sources and form part of equipment intended to remain functional in an atmosphere endangered by firedamp and/or coal dust.

1.4 It does not apply to Category M1 Miners' Caplights, which are dealt with in prEN 62013-1 (in preparation).

NOTE 1 As the energy needed to ignite a coal dust/air cloud is in excess of 600 times* that needed to ignite a firedamp/air mixture, this standard assumes that provided intrinsically safe “ia” circuits are constructed to be safe in an explosive atmosphere of firedamp/air, then such circuits are not capable of directly igniting an explosive atmosphere of coal dust/air.

** Based on tests performed by several member state laboratories. Verified at the UK Health & Safety Laboratories, Buxton - Report by Dr P. Tolson, dated 9 August 1995 – “Ignition of coal dust/air mixtures using a modified IEC spark test apparatus”.*

NOTE 2 In designing equipment for operation in explosive atmospheric conditions other than those given in 1.1 above, this standard may be used as a guide. In such cases, additional testing is recommended to allow the manufacturer to be able to demonstrate that the equipment is suitable for the exceptional conditions of use.

NOTE 3 When an explosive firedamp atmosphere occurs in the underground workings of a mine, or at a surface installation, it is imperative that the ignition risk be kept to a minimum. Member State Governments may therefore prohibit the continued use of certain Category M1 equipment in an atmosphere endangered by firedamp and/or coal dust if it is not necessary for it to remain functional for the protection of workers**.

*** This has its origin in clause 5.1 of the proposals to the Governments of Members States adopted by the Safety and Health Commission for Mining and Other Extractive Industries (SHCMOEI) at its meeting on 29.10.1986. Document No 6374/13/82 – “Electrical apparatus and systems for use when the concentration of firedamp exceeds the statutory limit for electricity”.*

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50014		Electrical apparatus for potentially explosive atmospheres - General requirements.
EN 50016		Electrical apparatus for potentially explosive atmospheres - Pressurized apparatus "p".
EN 50017		Electrical apparatus for potentially explosive atmospheres - Powder filling "q".
EN 50018		Electrical apparatus for potentially explosive atmospheres - Flameproof enclosure "d".
EN 50019		Electrical apparatus for potentially explosive atmospheres - Increased safety "e".
EN 50020		Electrical apparatus for potentially explosive atmospheres - Intrinsic safety "i".
EN 50028		Electrical apparatus for potentially explosive atmospheres - Encapsulation "m".
prEN 13463-1		Non-electrical equipment for potentially explosive atmospheres - Part 1: Basic methodology and requirements.
prEN 13463-3		Non-electrical equipment for potentially explosive atmospheres - Part 3: Protection by flameproof enclosure "d".
prEN 13463-4		Non-electrical equipment for potentially explosive atmospheres - Part 4: Protection by inherent safety.
prEN 13463-5		Non-electrical equipment for potentially explosive atmospheres - Part 5: Protection by constructional safety "c".
prEN 13463-7		Non-electrical equipment for potentially explosive atmospheres - Part 7: Protection by pressurization "p".
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989).
prEN 62013-1		Caplights for use in mines susceptible to firedamp - Part 1: General requirements - Construction and testing in relation to the risk of explosion.

3 Definitions

3.1

explosion protection

any of the types of protection listed in clause 2 that can be applied to equipment to prevent it becoming an igniting source for an explosive atmosphere

3.2

equipment

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

NOTE For the purpose of this standard, "equipment" includes systems which are intended to be supplied to the user as a complete entity. It also includes any external electric cables and/or pipes forming part of such systems. Intrinsically safe electrical apparatus and systems are also included in the above definition.

3.3

equipment Group I

equipment intended for use in underground parts of mines, and those parts of surface installations of such mines, liable to be endangered by firedamp and/or coal dust clouds

3.4

potentially explosive atmosphere

an atmosphere which could become explosive due to local and operational conditions

3.5

explosive atmosphere

a 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

3.6

equipment Category M1

equipment designed and, where necessary, equipped with additional special means 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 coal dust clouds. Equipment in this category is intended 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:

- a) either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection,
- b) or, the requisite level of protection is assured in the event of two faults occurring independently of each other.

3.7

equipment Category M2

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 coal dust clouds. This equipment is intended to be de-energized in the event of an explosive atmosphere. The means of protection relating to equipment in this category assure the requisite level of protection during normal operation and also in the case of more severe operating conditions, in particular those arising from rough handling and changing environmental conditions

NOTE Although Category M2 equipment is designed and constructed to be safe in an atmosphere of firedamp and/or coal dust up to concentration level where it changes from being potentially explosive to becoming explosive, Member State Governments may have regulations requiring certain mining equipment to be isolated or made safe at atmospheric concentrations well below the "lower explosive limit" to introduce a safety factor.

3.8

firedamp

flammable mixture of gases or any flammable gas naturally occurring in a mine

NOTE Because firedamp normally consists mainly of methane, the term "firedamp" and "methane" are used frequently in mining practice as synonyms. Where significant proportions of other flammable gases may be present, additional testing is required by 4.1 of EN 50014 and prEN 13463-1.