

# Caplights for use in mines susceptible to firedamp —

## Part 1: General requirements — Construction and testing in relation to the risk of explosion

The European Standard EN 62013-1:2002 has the status of a  
British Standard

ICS 29.260.20

National foreword

This British Standard is the official English language version of EN 62013-1:2002. It was derived by CENELEC from IEC 62013-1:1999. It supersedes BS EN 50033:1991 which will be withdrawn on 2003-06-30.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by common modification tags Ⓒ Ⓓ.

The UK participation in its preparation was entrusted by Technical Committee GEL/31, Electrical apparatus for explosive atmospheres, to Subcommittee GEL/31/14, Types of protection “E” and “N”, which has the responsibility to:

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

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English version

**Caplights for use in mines susceptible to firedamp**  
**Part 1: General requirements -**  
**Construction and testing in relation to the risk of explosion**  
(IEC 62013-1:1999, modified)

Lampes-chapeaux utilisables dans les  
mines grisouteuses  
Partie 1: Règles générales -  
Construction et essais en relation avec  
le risque d'explosion  
(CEI 62013-1:1999, modifiée)

Kopfleuchten für die Verwendung in  
schlagwettergefährdeten Grubenbauen  
Teil 1: Allgemeine Anforderungen -  
Konstruktion und Prüfung in Relation  
zum Explosionsrisiko  
(IEC 62013-1:1999, modifiziert)

This European Standard was approved by CENELEC on 2001-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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## CENELEC

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

### Foreword

The text of the International Standard IEC 62013-1:1999, prepared by IEC TC 31, Electrical apparatus for explosive atmospheres, together with the common modifications prepared by the SC 31-4, Increased safety "e", of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 62013-1 on 2001-06-01.

This European Standard was prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers the essential safety requirements of the EC Directive 94/9/EC.

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) 2002-10-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2004-08-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the International Standard IEC 62013-1:1999 was approved by CENELEC as a European Standard with agreed common modifications.

### Introduction

Ⓒ In the absence of any suitable category M1 caplight, caplights constructed to this standard may be used for short periods of time in mines which have become temporarily endangered by an explosive atmosphere of firedamp without having to de-energize them. Ⓒ

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## CAPLIGHTS FOR USE IN MINES SUSCEPTIBLE TO FIREDAMP –

### Part 1: General requirements – Construction and testing in relation to the risk of explosion

#### 1 Scope

Ⓒ This part of EN 62013 specifies requirements for the construction and testing of caplights for use in mines susceptible to firedamp (Group I – electrical apparatus for explosive gas atmospheres as defined in EN 50014). It deals only with the risk of the caplight becoming a source of ignition. The requirements of EN 50014 do not apply unless specified.

This standard covers category M2 caplights.

Where the caplight is to meet the requirements of EC Directive 94/9, subclause 5.1.1 and clauses 27 and 28 of EN 50014:1997 additionally apply. Ⓒ

#### 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.

IEC 60050(845):1987, *International Electrotechnical Vocabulary (IEV) – Chapter 845: Lighting*

IEC 60079-0:1998, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements*

IEC 60079-7:1990, *Electrical apparatus for explosive gas atmospheres – Part 7: Increased safety "e"*

IEC 60079-11:1999, *Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety "i"*

IEC 60079-20:1996, *Electrical apparatus for explosive gas atmospheres – Part 20: Data for flammable gases and vapours, relating to use of electrical apparatus*

IEC 60112:1979, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions*

IEC 60127-2:1989, *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 60332-1:1993, *Tests on electric cables under fire conditions – Part 1: Test on a single vertical insulated wire or cable*

IEC 60455-1:1998, *Resin based reactive components used for electrical insulation – Part 1: Definitions and general requirements*

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

### 3 Definitions

For the purposes of this part of IEC 62013, the definitions of IEC 60079-0, IEC 60050(845) and the following apply.

#### 3.1

##### **battery**

two or more cells electrically connected and suitable for use as a source of energy

#### 3.2

##### **battery container**

battery enclosure and any additional cover attached to it

#### 3.3

##### **caplight**

apparatus comprising a headpiece, connecting cable and rechargeable secondary cell(s)/ battery in a container (see figure 1)

#### 3.4

##### **cell**

assembly of electrodes and electrolyte in an enclosure which constitutes the basic unit of a battery

#### 3.5

##### **firedamp**

flammable mixture of gases naturally occurring in a mine (having characteristics as referenced in IEC 60079-20)

#### 3.6

##### **"sealed" cell**

cell which remains closed when it is operated within its specified design limits but permits the escape of gas through either a resetting or a non-resetting pressure release device if the internal pressure exceeds a predetermined value

#### 3.7

##### **secondary cell or battery**

electrochemical system capable of storing under chemical form the electrical energy received and which can give it back by reversion

### 4 General

#### 4.1 Enclosures

4.1.1 Enclosures made of light alloy shall conform to 8.1 of IEC 60079-0.

4.1.2 Enclosures made of plastic material shall conform to 7.3 of IEC 60079-0.

If the protection against ignition by dangerous electrostatic charges is by virtue of size, shape and layout, this shall be verified in accordance with one of the methods described in 10.13.

In the case of the test described in 10.13.1, the capacitance measured shall not exceed 50 pF.

In the case of the test described in 10.13.2, the highest value of charge  $Q_1$ ,  $Q_2$  or  $Q_3$  shall not exceed 60 nC.

4.2 Internal electrical connections shall conform to 4.2 of IEC 60079-7.

**4.3** Solid electrical insulating materials shall conform to 4.5 of IEC 60079-7.

**4.4** Internal wiring shall conform to 4.8 of IEC 60079-7.

**4.5** The caplight shall be constructed in such a manner that the circuit (without another apparatus connected)

- behaves as if solely resistive, and
- incorporates means to prevent ignition of firedamp by thermal effects or arcing.

**4.6** Where the caplight is also used to supply electrical power to another apparatus, the other apparatus shall conform to the requirements of one or more of the types of protection listed in IEC 60079-0 and the combination of the caplight and other apparatus shall be assessed as a whole to ensure that neither the caplight nor the apparatus adversely affects the type of explosion protection provided by each.

**4.7** Creepage and clearance distances – all wiring connections and printed wiring boards which can affect the type of protection afforded shall be considered to have infallible separations if they meet the following creepage and clearance requirements:

- 1,6 mm in air;
- 0,5 mm through solid insulation or under a coating;
- all insulating materials shall have a Comparative Tracking Index (CTI) of at least 175 (when tested in accordance with IEC 60112).

**4.8** It shall not be possible to obtain a current of greater than 50 mA between any two accessible points of the caplight when assembled for use.

## **5 Overcurrent protection**

**5.1** Overcurrent protection shall be provided which effectively limits the discharge current to a level unlikely to cause an ignition of an atmosphere endangered by firedamp. Such protection shall be provided by one or more of the following means, and shall conform to 5.2, or to 5.3 and 5.4, or to 5.3 and 5.5, and additionally to 5.6:

- a) a fuse or thermal circuit-breaker;
- b) selecting a battery with appropriate internal characteristics so that it is not capable of igniting the test gas when tested in accordance with 10.10;
- c) an infallible current-limiting resistor conforming to 3.9 of IEC 60079-11;
- d) an active current-limiting device assessed to IEC 60079-11.

If the battery-charging current passes through the protective means, the rating of that means shall be based on the charge current or discharge current, whichever is the greater.

**5.2** Where the means of overcurrent protection is a fuse or thermal circuit-breaker and the caplight is constructed in such a manner that

- the nominal voltage is not greater than 6 V;
- the value of the current in normal use is not greater than 1,5 A, and
- the nominal rating of the lamp is not greater than 6 W

the fuse or thermal circuit-breaker shall conform to the following requirements:

- a) the fuse or thermal circuit-breaker shall be protected so that, when tested according to 10.5, there is no ignition of any surrounding gas mixture,