

## II

*(Acts whose publication is not obligatory)*

## COUNCIL

## COUNCIL DIRECTIVE

of 15 February 1982

on the approximation of the laws of the Member States concerning electrical equipment for use in potentially explosive atmospheres in mines susceptible to firedamp

(82/130/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission <sup>(1)</sup>,

Having regard to the opinion of the European Parliament <sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee <sup>(3)</sup>,

Whereas legislation in force in the Member States to ensure the safety of electrical equipment for use in potentially explosive atmospheres in mines susceptible to firedamp differs from one Member State to another; whereas these differences are such as to constitute a barrier to trade;

Whereas such differences may be eliminated by approximating the laws of the Member States in order to allow electrical equipment complying with

harmonized standards for use in potentially explosive atmospheres in mines susceptible to firedamp to be put on the market throughout the Community;

Whereas provision should also be made to allow electrical equipment using technical processes different from those of these harmonized standards to be put on the market, provided such equipment ensures a level of safety equivalent to that of equipment which conforms to the harmonized standards;

Whereas, however, compliance with harmonized standards or equivalence of safety levels to that of equipment which conforms to the harmonized standards should be verified and tested by a body approved by the Member State concerned;

Whereas a positive result of such verifications and tests should be confirmed both by a certificate and the mark recognized in all Member States;

Whereas, in order to take account of technical progress, the technical requirements prescribed in the harmonized standards on electrical equipment for use in potentially explosive atmospheres in mines susceptible to firedamp need to be adapted promptly; whereas, to facilitate the implementation of the measures necessary in this connection, a procedure should be laid down to ensure close cooperation between the Member States and the Commission through the Committee on the adaptation

<sup>(1)</sup> OJ No C 104, 28. 4. 1980, p. 92.

<sup>(2)</sup> OJ No C 197, 4. 8. 1980, p. 66.

<sup>(3)</sup> OJ No C 205, 11. 8. 1980, p. 28.

to technical progress of the Directives on the removal of technical barriers to intra-Community trade in electrical equipment in potentially explosive atmospheres in mines susceptible to firedamp;

Whereas it is possible that electrical equipment for use in potentially explosive atmospheres in mines susceptible to firedamp, although certified and marked for free movement, may represent a safety risk; whereas a procedure should therefore be laid down to obviate this risk;

Whereas the mining legislation in different Member States applies also to surface installations of mines susceptible to firedamp; whereas it is necessary to include in this Directive electrical equipment for use in such installations; whereas it is therefore necessary to derogate from Council Directive 76/117/EEC of 18 December 1975 on the approximation of the laws of the Member States concerning electrical equipment for use in potentially explosive atmospheres<sup>(1)</sup> and from Council Directive 79/196/EEC of 6 February 1979 on the approximation of the laws of the Member States concerning electrical equipment for use in potentially explosive atmospheres employing certain types of protection<sup>(2)</sup>,

HAS ADOPTED THIS DIRECTIVE:

#### *Article 1*

This Directive shall apply to electrical equipment for use in underground parts of mines susceptible to firedamp which may be endangered by firedamp.

This Directive shall also apply, by way of derogation from Directives 76/117/EEC and 79/196/EEC, to electrical equipment for use in those parts of surface installations of such mines which may be endangered by firedamp from underground ventilation.

#### *Article 2*

Electrical equipment within the meaning of this Directive covers any constituent part of an electrical installation or any other electrical device.

<sup>(1)</sup> OJ No L 24, 30. 1. 1976, p. 45.

<sup>(2)</sup> OJ No L 43, 20. 2. 1979, p. 20.

#### *Article 3*

The designation of underground parts of mines susceptible to firedamp which may be endangered by firedamp and the surface installations of such mines which may be endangered by firedamp from underground ventilation is left to the initiative of the Member States.

#### *Article 4*

1. Member States may not, on safety grounds in respect of the ignition of firedamp, prohibit the sale, free movement or use for its proper purpose of the electrical equipment referred to in Articles 1 and 2:

- if its conformity with the harmonized standards is attested by a certificate of conformity issued under the conditions laid down in Article 8 and by the affixing of the distinctive Community mark provided for in Article 11,
- if it differs from harmonized standards because no provision was made in such standards for its design and manufacture, but the verifications and tests have established that it offers a degree of safety at least equivalent to that of equipment which conforms to the harmonized standards and this is attested by an inspection certificate issued under the conditions laid down in Article 9 and by the affixing of the distinctive Community mark provided for in Article 11.

2. Within the meaning of this Directive, use for its proper purpose means use of the electrical equipment, as provided for in the harmonized standards and recorded on the certificate of conformity or inspection certificate, in places where firedamp is liable to form an explosive mixture with air.

3. Where they are not subject to other Community provisions, installation conditions and conditions of use shall remain subject to the laws, regulations and administrative provisions of the Member State concerned.

4. Within the meaning of this Directive, the European Standards (ENs) listed in Annex A and amended in accordance with Annex B are the harmonized standards.

#### *Article 5*

1. Any amendments to the content of the Annexes which are necessary to take account of technical progress shall be adopted in accordance with the procedure set out in Article 7.

2. Likewise, any question relating to the inspection certificates referred to in the second indent of Article 4 (1) may be examined in accordance with this procedure.

#### Article 6

1. The Restricted Committee of the Safety and Health Commission for the Mining and other Extractive Industries set up by Council Decisions of 9 July 1957, 11 March 1965 and 27 June 1974 is hereby charged with the tasks defined in Article 5. Such Committee shall be composed of representatives of the Member States and chaired by a representative of the Commission.

2. The Committee shall establish its own rules of procedure.

#### Article 7

1. If recourse is had to the procedure defined in this Article, the matter shall be placed before the Committee by its chairman, either on his own initiative or at the request of the representative of a Member State.

2. The chairman shall submit to the Committee a draft of the measures to be taken. The Committee shall deliver its opinion within a period which may be fixed by the chairman according to the urgency of the matter. At least 45 votes shall be required before it can deliver its opinion, the votes of Member States being weighted as provided for in Article 148 (2) of the Treaty. The chairman shall not vote.

3. (a) The Commission shall adopt the proposed measures if they are in accordance with the opinion of the Committee.

(b) If the proposed measures are not in accordance with the opinion of the Committee, or if no opinion is expressed, the Commission shall without delay submit a proposal to the Council on the measures to be taken. The Council shall act by a qualified majority.

(c) If the Council has not acted within three months of the date on which the matter was brought before it, the Commission shall adopt the proposed measures.

#### Article 8

1. The certificate of conformity referred to in the first indent of Article 4 (1) shall be issued by one of the

approved bodies referred to in Article 14. It shall attest that the type of electrical equipment concerned complies with the harmonized standards.

A copy of the certificate of conformity shall be forwarded to the Member States and to the Commission within one month of the issue of the certificate.

The approved body which has verified and tested the electrical equipment shall draw up a report which shall be placed at the disposal of the Member States.

2. The approved body which issues the certificate of conformity may withdraw such certificate where it finds that it should not have been issued or where the stipulated conditions have not been met. It may also withdraw such certificate where the manufacturer places on the market electrical equipment which is not in conformity with the type of equipment for which the certificate was issued.

The approved body shall submit a copy of the withdrawal document to the Commission and to the Member States, which shall provide for its transmission to the approved bodies.

The grounds for such withdrawal shall be given in detail. Notice of the withdrawal shall be published in accordance with paragraph 4.

Such withdrawals, and refusals to issue a certificate of conformity, shall be notified forthwith to the party concerned, with an indication of the remedies available under the laws in force in the Member States and of the time limits for the exercise of such remedies.

3. All documents used for certification of the electrical equipment must be held by the originating body and shall if necessary be placed at the disposal of the Commission and the other Member States for the purpose of any special investigation pertaining to safety; the confidentiality of these documents shall be respected.

4. The Commission shall ensure that relevant extracts from these certificates of conformity are published in the *Official Journal of the European Communities*.

#### Article 9

1. The inspection certificate referred to in the second indent of Article 4 (1) shall be issued by one of the bodies referred to in Article 14. It shall attest that the type of electrical equipment offers a degree of safety at

least equivalent to that of equipment conforming to the harmonized standards.

2. Before the relevant approved body issues an inspection certificate, the Member State, on the initiative of that approved body, shall send the documents used for certification of the electrical equipment, that is the specifications of the equipment, the report on the verifications and tests carried out by that body and the draft inspection certificate to the Commission and to the other Member States who shall provide for its transmission to the bodies which they have approved. Within four months of receiving this information, such Member States may express their disagreement to the Member State concerned or may request that the matter be referred to the Committee provided for in Article 6. A copy of each communication shall be submitted to the Commission. All correspondence shall be confidential.

3. If, within the time limit specified in paragraph 2, no Member State has expressed disagreement nor requested that the matter be referred to the Committee, the Member State shall authorize the issue of the inspection certificate.

4. If this is not the case, the Commission shall act on the request for the inspection certificate after having obtained the opinion of the Committee.

5. A copy of the inspection certificate shall be sent to the Commission and to the Member States within one month of the issue of the certificate; the Member States shall provide for its transmission to the bodies which they have approved. The approved body which has verified and tested the electrical equipment shall draw up a final report. This shall be placed at the disposal of the Member States.

6. The approved body which issues an inspection certificate may withdraw such certificate where it finds that it should not have been issued or that the stipulated conditions have not been met. It may also withdraw such certificate if the manufacturer places on the market electrical equipment which is not in conformity with the type of equipment for which the inspection certificate was issued.

The approved body shall send a copy of the withdrawal documents to the Commission and to all Member States, which shall provide for its transmission to the bodies which they have approved.

The grounds for such withdrawal shall be given in detail. Notice of the withdrawal shall be published in accordance with paragraph 8.

Such withdrawals, and refusals to issue an inspection certificate, shall be notified forthwith to the party

concerned, with an indication of the remedies available under the laws in force in the Member States and of the time limits for the exercise of such remedies.

7. All documents used for certification of the electrical equipment must be held by the originating body and shall if necessary be placed at the disposal of the Commission and the other Member States for the purpose of any special investigation pertaining to safety; the confidentiality of such documents shall be respected.

8. The Commission shall ensure that relevant extracts from these inspection certificates are published in the *Official Journal of the European Communities*.

#### Article 10

Copies of the documents referred to in Article 8 (3) and Article 9 (7) shall be forwarded to the holder of the certificate at his request; he shall be free to use them as he wishes.

#### Article 11

1. The distinctive Community mark affixed to electrical equipment by the manufacturer shall attest that such equipment conforms to the type of equipment which has received a certificate of conformity or an inspection certificate, and that it has undergone any routine verifications and tests either prescribed by the harmonized standards in the case that a certificate of conformity has been issued or referred to in the certificate of inspection itself.

The model of the distinctive Community mark is reproduced in Section I of Annex C. Such mark shall be affixed in such a way as to be visible, legible and durable.

2. The Member States shall take adequate measures to ensure that the distinctive Community mark is affixed by the manufacturer only if he possesses the appropriate certificate of conformity or the appropriate inspection certificate. They shall also take all necessary measures to prohibit the affixing on equipment not covered by a certificate of conformity or by an inspection certificate of marks or inscriptions which might be confused with the distinctive Community mark.

3. The certificate of conformity or the inspection certificate may stipulate that the electrical equipment be accompanied by instructions explaining the special conditions for its use.

4. When an inspection certificate in accordance with Article 9 has been issued for a type of electrical equipment which is not in conformity with the harmonized standards, the distinctive Community mark must be supplemented by the marking specified in Section II of Annex C.

5. The model of the certificate of conformity is contained in Annex D.

#### *Article 12*

Member States shall make all necessary arrangements to ensure adequate surveillance of the manufacture of the electrical equipment covered by this Directive.

#### *Article 13*

1. If a Member State establishes, on the basis of a close examination, that electrical equipment, although complying with a type of equipment for which a certificate of conformity or an inspection certificate was issued, represents a safety hazard, it may provisionally prohibit the sale of the equipment in its territory or make it subject to special conditions. It shall immediately inform the other Member States and the Commission thereof, stating the grounds for its decision.

2. The Commission shall, within six weeks, consult the Member States. It shall then deliver its opinion forthwith and take appropriate measures.

3. Where the Commission is of the opinion that technical adaptations to the harmonized standards are necessary, such adaptations shall be adopted under the procedure laid down in Article 7. In that event, the Member State which has adopted safeguard measures may maintain them until such adaptations enter into force.

#### *Article 14*

Each Member State shall forward to the other Member States and the Commission a list of the bodies approved by it to verify and test the equipment and/or issue the certificates of conformity and the inspection certificates, and the addresses for the correspondence referred to in Articles 8 and 9.

The above notification must be completed not later than six months after notification of this Directive.

Each Member State shall immediately report any change in these lists.

#### *Article 15*

Member States shall take the measures necessary to comply with this Directive within 18 months of its notification. They shall forthwith inform the Commission thereof.

Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field governed by this Directive.

#### *Article 16*

This Directive is addressed to the Member States.

Done at Brussels, 15 February 1982.

*For the Council*

*The President*

P. de KEERSMAEKER

## ANNEX A

## EUROPEAN STANDARDS DRAWN UP BY CENELEC

1. Electrical apparatus for potentially explosive atmospheres  
General requirements EN 50 014 (first edition, March 1977) with amendment No 1;
2. Electrical apparatus for potentially explosive atmospheres  
Oil immersion 'o', EN 50 015 (first edition, March 1977) with amendment No 1;
3. Electrical apparatus for potentially explosive atmospheres  
Pressurized apparatus 'p', EN 50 016 (first edition, March 1977) with amendment No 1;
4. Electrical apparatus for potentially explosive atmospheres  
Powder filling 'q', EN 50 017 (first edition, March 1977) with amendment No 1;
5. Electrical apparatus for potentially explosive atmospheres  
Flameproof enclosure 'd', EN 50 018 (first edition, March 1977) with amendment No 1;
6. Electrical apparatus for potentially explosive atmospheres  
Increased safety 'e', EN 50 019 (first edition, March 1977) with amendment No 1;
7. Electrical apparatus for potentially explosive atmospheres  
Intrinsic safety 'i', EN 50 020 (first edition, March 1977) with amendment No 1.

## ANNEX B

## Amendments made to the European Standards listed in Annex A

## Appendix 1

## ELECTRICAL APPARATUS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES OF GROUP I

## GENERAL REQUIREMENTS

1. Replace the text of 6.3 of European Standard EN 50 014 (first edition, March 1977) by:

'Enclosures of plastics materials with surface area projected in any direction of more than 100 cm<sup>2</sup> or containing exposed metallic parts with a capacitance to earth of more than 3 pF, under the most unfavourable conditions in practice, shall be so designed that under normal conditions of use, maintenance and cleaning, danger of ignition due to electrostatic charges is avoided.

This requirement shall be satisfied:

- either by suitable selection of the material: its insulation resistance measured according to the method given in 22.4.7 of this Annex shall not exceed:
  - 1 G  $\Omega$  at 23  $\pm$  2 °C and 50  $\pm$  5 % relative humidity,
  - or
  - 100 G  $\Omega$  under extreme service conditions of temperature and humidity specified for the electrical apparatus; the sign 'X' shall then be placed after the certificate reference, as given in 26.2.9;
- or by the size, shape, layout or by other protective methods; the nonappearance of dangerous electrostatic charges shall then be verified by actual tests for ignition of an air-methane mixture of (8.5  $\pm$  0.5) % methane.

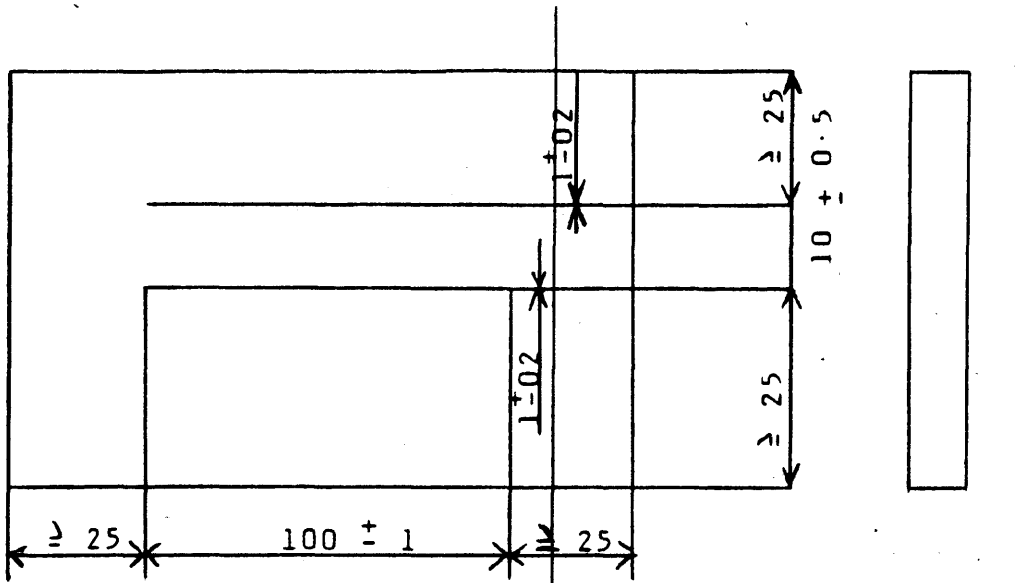
If however any danger of ignition cannot be avoided in the design, a warning label shall indicate the safety measures to be applied in service.'

2. Replace the text of 22.4.7 of European Standard EN 50 014 (first edition, March 1977) by:

'The resistance is tested on the part itself if its size permits, or on a test piece comprising a rectangular plate with dimensions in accordance with Figure 2, on which two parallel electrodes are painted on the surface, using a conducting paint with a solvent which does not have any effect on the insulation resistance.

Figure 2

## Test piece with painted conducting electrodes



(Dimensions in millimetres)

The test piece shall have an intact surface and shall be cleaned with distilled water, then with isopropyl alcohol (or any other solvent that can be mixed with water and will not affect the material of the test piece), then once more with distilled water before being dried. Untouched by bare hands, it shall then be conditioned for 24 hours at the temperature and humidity required in 6.3. The test shall be carried out under the same conditions.

The direct voltage applied for one minute between the electrodes shall be equal to  $500 \text{ V} \pm 10 \text{ V}$ .

During the test, the voltage shall be sufficiently steady so that the charging current due to voltage fluctuation will be negligible compared with the current flowing through the test piece. In certain cases this requirement implies the use of batteries or accumulators.

The insulation resistance is the ratio of the direct voltage applied at the electrodes to the total current flowing between them when the voltage has been applied for one minute.

Possible methods are indicated in Annex C.

In cases where cleaning would adversely affect the significance of the test results, an additional test may be made without first cleaning the test piece.



## Appendix 2

## ELECTRICAL APPARATUS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES OF GROUP I

## FLAMEPROOF ENCLOSURES 'd'

1. Supplement the European Standard EN 50 018 (first edition, March 1977) by:

'11.7. In flameproof enclosures of Group I insulating materials subjected to electrical stresses capable of causing arcs in air and which result from rated currents of more than 16 A (in switching apparatus such as circuit-breakers, contactors, isolators) shall pass a test for resistance to tracking according to IEC Publication 112. This test shall be made with 50 drops at a voltage of 400 volts, but with a solution containing  $(0.1 \pm 0.002)$  % by mass ammonium chloride and  $(0.5 \pm 0.002)$  % by mass sodium-alkylnaphthalene-sulphonate in distilled or deionized water. The resistivity of the solution at  $(23 \pm 1)$  °C is  $(170 \pm 5)$   $\Omega \cdot \text{cm}$ .

The abovementioned insulating materials which do not pass this test may be used, however, if their volume is limited to 1 % of the total volume of the empty enclosure or if a suitable detection device enables the power supply to the enclosure to be disconnected, on the supply side, before possible decomposition of the insulating material leads to dangerous conditions; the presence and effectiveness of such a device shall be verified by the testing station.'

2. Replace the text of 12.3 of European Standard EN 50 018 (first edition, March 1977) by:

'12.3.1. For mechanically or electrically interlocked plugs and sockets, the width and the gap of the flameproof joints of the flameproof enclosure shall be determined by the volume which exists at the moment of separation of the contacts.

12.3.2. The properties of the flameproof enclosure, type of protection 'd' of mechanically or electrically interlocked plugs and sockets shall be maintained in the event of an internal explosion both when the plugs and sockets are connected together and at the moment of separation of the contacts.

12.3.3. The fixed part of a plug and socket connector shall maintain the flameproof properties of the enclosure on which it is mounted, even when the movable part is removed.'

3. Add the following note after the second paragraph of 14.1.1 of European Standard EN 50 018 (first edition, March 1977):

'Note: In particular, it is possible to test the enclosures without the enclosed apparatus. In this case the testing station shall state in the certificate, on the basis of proposals made by the manufacturer, the kinds of enclosed apparatus permitted and their mounting conditions.'

4. Add a new section in the European Standard EN 50 018 (first edition, March 1977):

## 'SECTION IV

## OTHER REQUIREMENTS

## 16. Switchgear

Group I flameproof enclosures containing switching devices which produce, in service, arcs or sparks capable of igniting an explosive mixture shall comply with the following requirements:

### 16.1. Means of isolation

All accessible conductors, except those of intrinsically safe circuits complying with European Standard EN 50 020 or those for earthing purposes, shall be capable of isolation from the supply by a means of isolation before the opening of the flameproof enclosure.

The means of isolation of those flameproof enclosures shall be:

16.1.1. either fitted inside the flameproof enclosure; in this case the parts which remain energized after opening the means of isolation shall be protected by one of the standard types of protection listed in European Standard EN 50 014 "General requirements", and access to them shall be prevented by a cover bearing a label "DO NOT OPEN WHILE ENERGIZED". This does not apply to parts which remain energized of intrinsically safe circuits complying with European Standard EN 50 020 "Intrinsic safety 'I'";

(Note: If the type of protection "Increased safety 'e'" according to European Standard EN 50 019 is concerned the specified degree of protection IP 54 may be reduced to IP 20.)

16.1.2. or fitted inside another enclosure, complying with one of the standard types of protection listed in European Standard EN 50 014 "General requirements";

16.1.3. or consist of a plug and socket complying with the requirements of 12. 3 of this European Standard.

### 16.2. Doors or covers

#### 16.2.1. Quick-acting doors or covers:

These doors or covers shall be mechanically interlocked with an isolator so that:

- (a) the enclosure retains the properties of the flameproof enclosure, type of protection "d", as long as the isolator is closed and;
- (b) the isolator can only be closed when these doors or covers ensure the properties of the flameproof enclosure, type of protection "d".

#### 16.2.2. Doors or covers fixed by screws:

These doors or covers shall bear a label "DO NOT OPEN WHILE ENERGIZED".

### 16.3. Supplementary conditions

Any flameproof enclosure with a door or cover fixed by screws (see 16.2.2) is subject to the following supplementary conditions:

16.3.1. The marking shall include the symbol "X" defined in European Standard EN 50 014 "General requirements".

16.3.2. The certificate shall state the conditions of use to be observed in order to ensure safety.

Note: The conditions of use to be specified in the certificate depend on the kind of apparatus contained in the flameproof enclosure:

- if the enclosure only contains an isolator, possibly with auxiliary contacts, bus bars and connection facilities, the certificate shall state that the enclosure may not contain any other electrical component,
- if the enclosure may contain other electrical components, the certificate shall state that a means of isolation shall be near the enclosure.

## 17. Lampholders and lampcaps

17.1. The following requirements apply to lampholders and lampcaps which together have to form a flameproof enclosure, type of protection "d", so that they may be used in luminaires of increased safety, type of protection "e".

17.2. The device which prevents lamps working loose, required in 4.3.3 of European Standard EN 50 019 "increased safety 'e'", may be omitted for threaded lampholders provided with a quick-acting switch in a flameproof enclosure, type of protection "d", which breaks all poles of the lamp circuit before contact separation.

### 17.3. Holders for cylindrical caps

17.3.1. The holders for tubular fluorescent lamps shall:

- be single-pin and
- comply with IEC-Publication 61.2.

17.3.2. Other holders: The width of the flameproof joint between the holder and the cap at the moment of contact separation shall be at least 10 mm.

### 17.4. Holders for threaded caps

17.4.1. The threaded part of the holder shall be of a material which is resistant to corrosion under the likely conditions of service.

17.4.2. At the moment of contact separation during unscrewing of the lamp, at least two complete turns of the thread shall be engaged.

17.4.3. In threaded lampholders E 27 and E 40 for electrical apparatus of Groups IIB and IIC, electrical contact shall be established by means of spring-loaded contact elements. In addition, during insertion and removal of the lamp, the closing and opening of the contact must be within a flameproof enclosure, type of protection "d", of Group IIC.

*Note:* The requirements of 17.4.3 are not necessary for electrical apparatus of Groups I and IIA and for threaded lampholders E 10 and E 14.

## Appendix 3

### ELECTRICAL APPARATUS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES OF GROUP I

#### INTRINSIC SAFETY 'i'

#### INTRINSICALLY SAFE ELECTRICAL SYSTEMS

*Note:* In mines susceptible to firedamp in the Federal Republic of Germany, the word 'Anlage' is used instead of 'System'.

### 1. Scope

1.1. This Annex contains the specific requirements for construction and testing of intrinsically safe electrical systems all or parts of which are intended for installation in potentially explosive atmospheres of mines susceptible to firedamp, in order to ensure that such electrical systems will not cause an explosion in the surrounding atmosphere.

1.2. This Annex supplements European Standard EN 50 020 'Intrinsic safety "i"' (first edition, March 1977) the requirements of which apply to the construction and testing of intrinsically safe electrical apparatus and associated electrical apparatus.

1.3. This Annex does not take the place of installation rules for intrinsically safe electrical apparatus, associated electrical apparatus and intrinsically safe electrical systems.

## 2. Definitions

2.1. The following definitions, specific to intrinsically safe electrical systems, are applicable in this Annex. They supplement the definitions which are in European Standards EN 50 014 'General requirements' and EN 50 020 'Intrinsic safety "i" '.

### 2.2. *Intrinsically safe electrical system*

An assembly of items of electrical apparatus defined in a descriptive system document in which the interconnecting circuits, or parts of such circuits, intended for use in a potentially explosive atmosphere, are intrinsically safe circuits, and which meet the requirements of this Annex.

### 2.3. *Certified intrinsically safe electrical system*

An electrical system conforming to 2.2 for which a testing station has issued a system certificate, certifying that the type of electrical system complies with this Annex.

*Note 1:* It is not necessary for each electrical apparatus in an intrinsically safe electrical system to be certified individually, but it must suitably be identifiable.

*Note 2:* In so far as the national regulations for installation make it possible, electrical systems conforming to 2.2, for which the knowledge of the electrical parameters of the items of certified intrinsically safe electrical apparatus, certified associated electrical apparatus, non-certified devices conforming to 1.3 of European Standard EN 50 014 'General requirements' and the knowledge of the electrical and physical parameters of the components and interconnecting wiring permits the unambiguous deduction that intrinsic safety is conserved, can be installed without additional certificates.

### 2.4. *Accessory*

Electrical apparatus which contains only components for connecting and switching intrinsically safe circuits and which do not prejudice the intrinsic safety of the system, such as terminal boxes, junction boxes, plugs and sockets and similar items, switches, etc.

## 3. Categories of intrinsically safe electrical systems

3.1. Intrinsically safe electrical systems, or parts thereof, shall be placed in one of two categories: 'ia' or 'ib'. The requirements of this Annex apply to both categories, unless otherwise specified.

*Note:* Intrinsically safe electrical systems, or parts thereof, may have categories different from those of the intrinsically safe electrical apparatus and associated electrical apparatus included in the system or part thereof. Also different parts of an intrinsically safe electrical system may have different categories.

### 3.2. *Category 'ia'*

Intrinsically safe electrical systems, or parts thereof, are of category 'ia' if they comply with the requirements for intrinsically safe electrical apparatus of category 'ia' (see 4.1 of European Standard EN 50 020 'Intrinsic safety') except that the intrinsically safe electrical system as a whole shall be considered as a single item of electrical apparatus.

### 3.3. *Category 'ib'*

Intrinsically safe electrical systems, or parts thereof, are of category 'ib' if they comply with the requirements for electrical apparatus of category 'ib' (see 4.2 of European Standard EN 50 020 'Intrinsic safety') except that the intrinsically safe electrical system as a whole shall be considered as a single item of electrical apparatus.

#### 4. Interconnecting wiring in an intrinsically safe electrical system

4.1. The electrical parameters and all characteristics of the interconnecting wiring specific to an intrinsically safe electrical system, in so far as intrinsic safety depends on them, shall be specified in the certification documents for that electrical system.

4.2. Where a multicore cable contains interconnections which are parts of more than one intrinsically safe circuit the cable shall meet the following requirements:

4.2.1. The radial thickness of the insulation shall be appropriate to the diameter of the conductor. In the case of polyethylene, the minimum radial thickness shall be 0.2 mm.

4.2.2. Before leaving the manufacturer's works, the multicore cable shall be submitted to AC dielectric tests specified either in 4.2.2.1 or in 4.2.2.2. The success of these tests shall be attested by a tests certificate issued by the cable manufacturer.

4.2.2.1. Either each core, before assembly into the cable, is tested at a voltage value (rms) equal to 3 000 V + (2 000 times the radial thickness of the insulation in mm) V; the assembled cable:

- is firstly tested at a voltage value (rms) equal to 500 V applied between all the armourings or screens of the cable joined together electrically and the bundle of all cores joined together electrically and
- is secondly tested at a voltage value (rms) equal to 1 000 V applied between a bundle comprising one half of the cable cores and a bundle comprising the other half of the cores.

4.2.2.2. Or the assembled cable:

- is firstly tested at a voltage value (rms) equal to 1 000 V applied between all the armourings or screens of the cable joined together electrically and the bundle of all cores joined together electrically and
- is secondly tested at a voltage value (rms) equal to 2 000 V applied in succession between each core of the cable and the bundle formed by all the other cores joined together electrically.

4.2.3. The tests prescribed in 4.2.2 shall be carried out with an a.c. voltage of substantially sinusoidal wave form at a frequency between 48 Hz and 62 Hz given by a transformer of appropriate power, taking into account the cable capacity. In the case of dielectric tests on assembled cables, the voltage shall be increased steadily to the specified value in a period not less than 10 seconds and then maintained for at least 60 seconds.

These tests are carried out by the cable manufacturer.

4.3. No fault between the cores of a multicore cable shall be taken into account if one of the two following requirements are satisfied:

4.3.1. The cable conforms to 4.2 and each individual intrinsically safe circuit is enclosed in a conducting screen providing at least 60 % coverage.

*Note:* The eventual connection of the screen to earth or frame will be specified in the installation rules.

4.3.2. The cable conforms to 4.2, is effectively protected against damage and each intrinsically safe circuit within the cable has, in normal operation, a peak voltage of equal to or less than 60 volts.

4.4. Where a multicore cable conforms with 4.2 but not with 4.3 and contains only intrinsically safe circuits forming parts of a single intrinsically safe electrical system, faults shall be considered between up to 4 cores of the cable in addition to the application of either 3.2 or 3.3.

4.5. Where a multicore cable conforms with 4.2 but not with 4.3 and contains intrinsically safe circuits forming parts of different intrinsically safe electrical systems, each intrinsically safe circuit contained in the cable shall have a safety factor of at least four times that required by either 3.2 or 3.3.

4.6. Where a multicore cable does not comply with 4.2 and 4.3, any number of faults between the cores of the cable shall be taken into account in addition to the application of 3.2 or 3.3.

4.7. The certification documents of the intrinsically safe electrical system shall specify the conditions of use resulting from the application of 4.3 to 4.6.

#### 5. Accessories used in intrinsically safe electrical systems

The accessories which are listed in the certification documents as parts of an intrinsically safe electrical system shall meet:

- points 6 and 7 of European Standard EN 50 014 'General requirements',
- points 5 and 10.3 of European Standard EN 50 020 'Intrinsic safety "i" '.

Their marking shall bear at least the manufacturer's name or its registered trade mark.

*Note:* The use of non-certified accessories is subject to the installation requirements.

#### 6. Type tests

Intrinsically safe electrical systems shall be type tested in accordance with the type test requirements of point 9 of European Standard EN 50 020 'Intrinsic safety "i" ' but taking into account point 4 of this Annex.

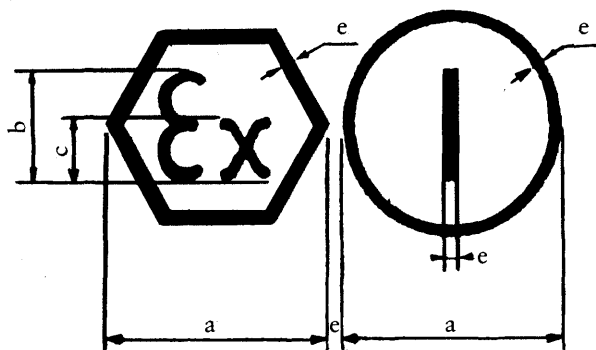
#### 7. Marking of intrinsically safe electrical systems

Certified intrinsically safe electrical systems shall be marked by the holder of the certificate of that system on at least one of the electrical apparatus set on a strategic position. The marking shall include the minimal marking of 26.5 of European Standard EN 50 014 'General requirements' and the letters 'SYST'.

## ANNEX C

## ELECTRICAL APPARATUS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES OF GROUP I

## I. DISTINCTIVE COMMUNITY MARK



$$b = 0.5 a$$

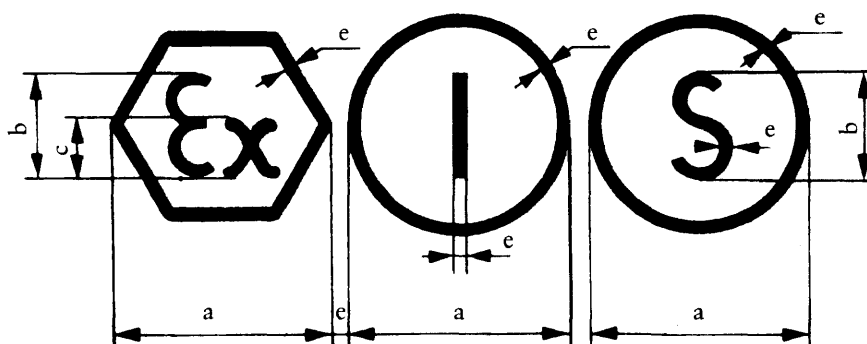
$$c = 0.25 a$$

$$e \geq 0.03 a$$

## II. MARKING OF ELECTRICAL APPARATUS COVERED BY AN INSPECTION CERTIFICATE

If a type of electrical apparatus which is not in conformity with the harmonized standards has been granted an inspection certificate as provided for in Article 9, the distinctive Community mark must be supplemented at least by the following:

1. The symbol 'S' signifying that it is an electrical apparatus suitable for gassy mines covered by an inspection certificate. This symbol shall immediately follow the distinctive Community mark as indicated below.
2. The last two numerals of the year of issue of the inspection certificate.
3. The serial number of the inspection certificate for that year.
4. The name or symbol of the body approved to issue the certificates.
5. The name of the manufacturer or his registered trade mark.
6. The manufacturer's type identification.
7. The manufacturer's serial number.
8. If the testing station considers that it is necessary to indicate special conditions for safe use the sign 'X' shall be placed after the certificate reference.
9. Any marking normally required by the standards of construction for the electrical apparatus.
10. Any supplementary marking considered necessary by the body approved to issue the certificates.



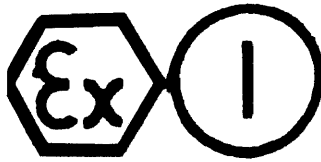
$$b = 0.5 a$$

$$c = 0.25 a$$

$$e \geq 0.03 a$$



## ANNEX D



Space for name and address, telephone and telex of the body approved to issue the certificates.

## ELECTRICAL APPARATUS OR SYSTEMS FOR MINES SUSCEPTIBLE TO FIREDAMP

1. **CERTIFICATE OF CONFORMITY**
2. Name or symbol of the body approved to issue the certificates — the last two numerals of the year of issue of the certificate — the serial number of the certificate — if appropriate the sign 'X'.
3. This certificate is issued for the following:
  - identification of the certified electrical apparatus or system,
  - certified type(s).
4. (a) Manufactured by:
  - name and address of manufacturer.
 (b) Submitted for certification by:
  - name and address of applicant.
5. This electrical apparatus or system and any acceptable variations thereto are specified in the Annex to this certificate and in the descriptive documents therein referred to.
6. Name or symbol, approved body in accordance with Article 14 of the Council Directive 82/130/EEC of 15 February 1982:
  - certifies that this electrical apparatus has been found to comply with the following harmonized European Standards:
    - (Enumerate any European Standard concerned, year of edition, enumerate the national standards concerned. Indicate, if appropriate, the Annex concerned of the Council Directive referred to above.)
    - and has successfully met the type verification and test requirements of these standards,
  - certifies that a confidential test report has been completed on these verifications and tests.
    - (If appropriate, give test report number.)
7. The code of the electrical apparatus is:
  - EEx, the symbol(s) of the type(s) of protection, I.
8. This certificate may only be reproduced in its entirety and without change.
 

Sheet ./...

The number to the left of the oblique indicates the page number, the number to the right indicates the number of pages of the certificate including Annex.
9. Certificate of conformity — repeat point 2 above.
10. By marking the supplied electrical apparatus, the manufacturer attests on his own responsibility that this electrical apparatus complies with the descriptive documents referred to in the Annex to this certificate and has satisfied routine verifications and tests required in the harmonized European Standards referred to in point 6 above.

11. The supplied electrical apparatus is authorized to carry the distinctive Community mark defined in Annex C of the Council Directive referred to in point 6 above. This mark is reproduced on the first page of this certificate; it shall be affixed to the electrical apparatus in such a way as to be visible, legible and durable.
  12. If the sign 'X' is placed after the certificate number, it indicates that the electrical apparatus is subject to the special conditions for safe use specified in the Annex to this certificate.
  13. Place and date (year, month and day) for the issue of the certificate.
  14. The Director of the certifying body (signature).
-

*Annex*

**A1. — Identification of the certified electrical apparatus or system**

— Certified type(s)

**A2. Description of the certified electrical apparatus or system**

.....  
.....

**A3. Descriptive documents**

.....  
.....

**A4. Specific parameters for the type(s) of protection concerned <sup>(1)</sup>**

.....  
.....

**A5. Marking of the certified electrical apparatus**

The marking shall be visible, legible and durable; it shall contain the following:

1. Refer to 26 of the European Standard EN 50 014 'General requirements' and, if appropriate, to the specific European Standards for the type(s) of protection concerned. If the certificate applies to more than one certified type, each type shall be fully indicated. Between each type 'or' shall be inserted.
2. The marking normally required by the standards of construction of the electrical apparatus concerned.

Refer to 26.2.11 of the European Standard EN 50 014 'General requirements'.

**A6. Routine verifications and tests**

Indicate to which verifications and tests each electrical apparatus is to be submitted before delivery in accordance with the requirements of the European Standard EN 50 014 'General requirements' and of the specific European Standards for the type(s) of protection concerned. The reference to these requirements shall be given.

Note 'None' if not applicable.

**A7. Special conditions for safe use**

Indicate the conditions when the sign 'X' is placed after the serial number of the certificate. Note 'None' if not applicable.

---

<sup>(1)</sup> E.g. in the case of intrinsic safety the limiting characteristics of external circuits (see 10.1 of European Standards EN 50 020 'Intrinsic safety "i"').