

# Electrical apparatus for potentially explosive atmospheres — Flameproof enclosures “d”

The European Standard EN 50018:1994 has the status of a  
British Standard

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## National foreword

This British Standard has been prepared under the direction of the General Electrotechnical Standards Policy Committee and is the English language version of EN 50018 *Electrical apparatus for potentially explosive atmospheres — Flameproof enclosures “d”*, published by the European Committee for Electrotechnical Standardization (CENELEC).

This standard should be read in conjunction with BS EN 50014:1993 *Electrical apparatus for potentially explosive atmosphere — General requirements*, which it supplements.

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 36, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

English version

## Electrical apparatus for potentially explosive atmospheres — Flameproof enclosures "d"

Matériel électrique pour atmosphères  
explosibles Enveloppe antidéflagrante "d"

Elektrische Betriebsmittel für  
explosionsgefährdete Bereiche Druckfeste  
Kapselung "d"

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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

This European Standard was prepared by CENELEC Subcommittee SC 31-2 Flameproof enclosures “d”.

It was submitted to the CENELEC members for formal vote in July 1993 and was approved by CENELEC as EN 50018 on 1994-03-08. This EN supersedes EN 50018:1977 and its amendments A1:1979, A2:1982 and A3:1985.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1994-12-01
- latest date of withdrawal of conflicting national standards(dow) –

This European Standard is to be read in conjunction with EN 50014:1992, Electrical apparatus for potentially explosive atmospheres — General requirements, and with the second editions of the European Standards for the specific types of protection used in the scope of EN 50014:1992. This European Standard should not be considered in conjunction with any of the first edition standards listed in EN 50014:1977.

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## 1 Scope

**1.1** This European Standard contains the specific requirements for the construction and testing of electrical apparatus with type of protection flameproof enclosure “d”, intended for use in potentially explosive atmospheres.

**1.2** This European Standard supplements European Standard EN 50014, the requirements of which apply to electrical apparatus with flameproof enclosure.

## 2 Publications

### 2.1 IEC publications referred to in European Standard EN 50018

IEC 61, *Lamp caps and holders together with gauges for the control of interchangeability and safety*

IEC 61-1 — supplement K (1983) Part 1: *Lamp caps* [HD 65.1 S1 (1978)]

IEC 61-2 — supplement G (1983) Part 2: *Lampholders*. [HD 65.2 S1 (1978)]

IEC 79-1A (1975) *Electrical apparatus for explosive gas atmospheres — Part 1: Construction and test of flameproof enclosures of electrical apparatus. First supplement: Appendix D: Method of test for ascertainment of maximum experimental safe gap*

IEC 82 (1984), *Ballasts for tubular fluorescent lamps*

IEC 112 (1979) *Recommended method for determining the comparative tracking index of solid insulating materials under moist conditions*. [HD 214 S2 (1980)]

IEC 529 (1989) *Degrees of protection provided by enclosures (IP Code)*. [EN 60529 (1991)]

IEC 707 (1981) *Methods of test for the determination of the flammability of solid electrical insulating materials when exposed to an igniting source*. [HD 441 S1 (1983)]

### 2.2 ISO standards referred to in European Standard EN 50018

ISO 31-0 (1992) *Quantities, units and symbols; — Part 0: General principles*

ISO 185 (1988) *Grey cast iron; classification*

ISO 468 (1982) *Surface roughness; Parameters, their values and general rules for specifying requirements*

ISO 965-1 (1980) *ISO general purpose metric screw threads; Tolerances; — Part 1: Principles and basic data*

ISO 965-3 (1980) *ISO general purpose metric screw threads; Tolerances; — Part 3: Deviations for constructional threads*

ISO 1210 (1992) *Plastics; Determination of burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source*

ISO 2738 (1987) *Permeable sintered metal materials; Determination of density, oil content, and open porosity*

ISO 4003 (1977) *Permeable sintered metal materials; Determination of bubble test pore size*

ISO 4022 (1987) *Permeable sintered metal materials; Determination of fluid permeability*

ISO 6892 (1984) *Metallic materials; Tensile testing*. [EN 10002-1 (1990) and EN 10002-1 AC1 (1990)].

### 2.3 European Standards referred to in European Standard EN 50018

EN 50014 (1992), *Electrical apparatus for potentially explosive atmospheres General requirements*.

EN 50019 (1994), *Electrical apparatus for potentially explosive atmospheres. Increased safety “e”*.

EN 50020 (1994), *Electrical apparatus for potentially explosive atmospheres. Intrinsic safety “i”*.

## 3 Definitions

The following definitions specific to type of protection flameproof enclosure “d” are applicable in this European Standard; they supplement the definitions which are given in European Standard EN 50014.

### 3.1 flameproof enclosure “d”

a 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

### 3.2 volume

the total internal volume of the enclosure. However, for enclosures in which the contents are essential in service, the volume to be considered is the remaining free volume

NOTE For luminaires, the volume is determined without lamps fitted.

### **3.3 flameproof joint**

the place where corresponding surfaces of two parts of an enclosure come together, or the conjunction of enclosures, and prevent the transmission of an internal explosion to the explosive atmosphere surrounding the enclosure

### **3.4 width of flameproof joint ( $L$ )**

the shortest path through a flameproof joint from the inside to the outside of an enclosure

### **3.5 distance ( $l$ )**

the shortest path through a flameproof joint, when the width of the joint  $L$  is interrupted by holes intended for the passage of fasteners for assembling the parts of the flameproof enclosure

### **3.6 gap of flameproof joint ( $i$ )**

the distance between the corresponding surfaces of a flameproof joint when the electrical apparatus enclosure has been assembled. For cylindrical surfaces, forming cylindrical joints, the gap is the difference between the diameters of the bore and the cylindrical component

### **3.7 maximum experimental safe gap (MESG) (for an explosive mixture)**

the maximum gap of a joint of 25 mm width which prevents any transmission of an explosion in 10 tests made under the conditions specified in IEC 79-1A

### **3.8 shaft**

a part of circular cross section used for the transmission of rotary movement

### **3.9 operating rod**

a part used for the transmission of control movements which may be rotary or linear or a combination of the two

### **3.10 pressure-piling**

the results of an ignition, in a compartment or subdivision of an enclosure, of a gas mixture pre-compressed for example due to a primary ignition in another compartment or subdivision

### **3.11 quick-acting door or cover**

a door or cover provided with a device which permits opening or closing by a simple operation, such as the movement of a lever or the rotation of a wheel. The device is arranged so that the operation has two stages:

- one for locking or unlocking;
- another for opening or closing.

### **3.12 door or cover fixed by threaded fasteners**

a door or cover the opening or closing of which requires the manipulation of one or more threaded fasteners (screws, studs, bolts or nuts)

### **3.13 threaded door or cover**

a door or cover which is assembled to a flameproof enclosure by a threaded flameproof joint

### **3.14 breathing device**

an integral or separable part of a flameproof enclosure designed to permit exchange between the atmosphere inside the enclosure and the surrounding atmosphere

### **3.15 draining device**

an integral or separable part of a flameproof enclosure designed to permit water formed by condensation to escape from the enclosure

## **4 Apparatus grouping and temperature classification**

The apparatus grouping and temperature classification defined in EN 50014 for the use of electrical apparatus in potentially explosive atmospheres apply to flameproof enclosures. The subdivisions A, B, C for electrical apparatus of Group II also apply.

## **Specific constructional requirements**

### **5 Flameproof joints**

#### **5.1 General requirements**

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

The design of joints shall be appropriate to the mechanical constraints applied to them.

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

The surface of joints may be protected against corrosion.

NOTE 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.

## 5.2 Non-threaded joints

### 5.2.1 Width of joints ( $L$ )

The width of joints shall not be less than the minimum values given in Table 1 and Table 2. The width of joint for cylindrical metallic parts press-fitted into the walls of a metallic flameproof enclosure of volume not greater than 2 000 cm<sup>3</sup> may be reduced to 5 mm, if:

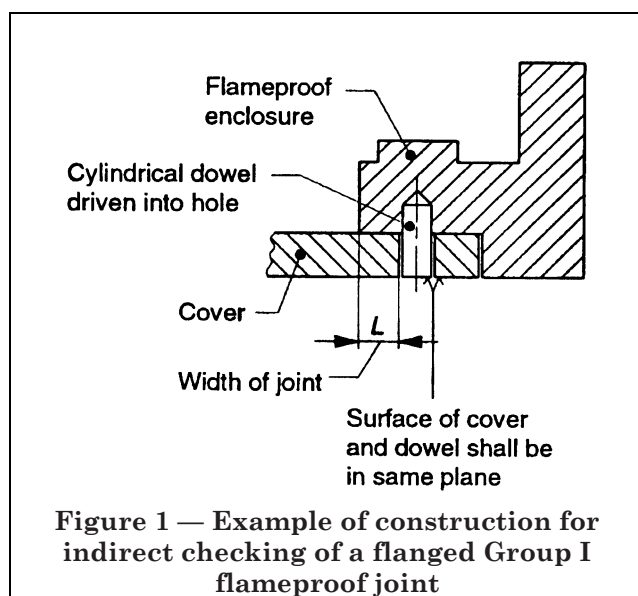
- the design does not rely only on an interference fit to prevent the part being displaced during the type tests of clause 15, and
- the assembly meets the impact test requirements of EN 50014, taking the worst case interference fit tolerances into account, and
- the external diameter of the press-fitted part, where the width of joint is measured, does not exceed 60 mm.

### 5.2.2 Gap ( $i$ )

The gap, if one exists, between the surfaces of a joint shall nowhere exceed the maximum values given in Table 1 and Table 2.

The surfaces of joints shall be such that their average roughness  $R_a$  (ISO 468) does not exceed 6,3  $\mu\text{m}$ .

For flanged joint there shall be no intentional gap between the surfaces, except for quick acting doors or covers.



For electrical apparatus of Group I, it shall be possible to check, directly or indirectly, the gaps of flanged joints of covers and doors designed to be opened from time to time. Figure 1 shows an example of construction for indirect checking of a flameproof joint.

### 5.2.3 Spigot joints

For the determination of the width  $L$  of spigot joints the following shall be taken into account:

- either the cylindrical part and the plane part (see Figure 2).

The gap if one exists, between the surfaces of the joint shall nowhere exceed the maximum values given in Table 1 and Table 2.

- or the cylindrical part only (see Figure 3).

In this case the plane part need not comply with the requirements of Table 1 and Table 2.

NOTE For gaskets see also 5.4.

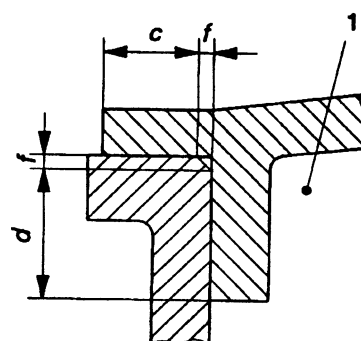


Figure 2

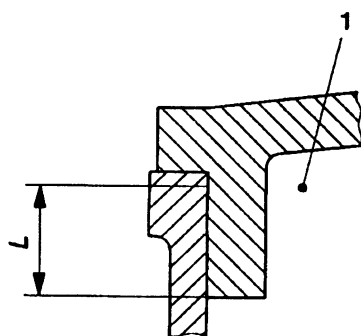


Figure 3

- $L = c + d$  (I, IIA, IIB, IIC)  
 $c \geq 6,0 \text{ mm}$  (IIC)  
 $\geq 3,0 \text{ mm}$  (I, IIA, IIB)  
 $d \geq 0,50L$  (IIC)  
 $f \leq 1,0 \text{ mm}$  (I, IIA, IIB, IIC)  
 1 Interior of enclosure

Figures 2 and 3 — Spigot joints

### 5.2.4 Holes in joint surfaces

Where a plane joint or the plane part or partial cylindrical surface (see 5.2.6) of a joint is interrupted by holes intended for the passage of threaded fasteners for assembling the parts of a flameproof enclosure, the distance  $l$  to the edge of the hole shall be equal to or greater than:

- 6 mm when the width of joint  $L$  is less than 12,5 mm;
- 8 mm when the width of joint  $L$  is equal to or greater than 12,5 mm but less than 25 mm;
- 9 mm when the width of joint  $L$  is equal to or greater than 25 mm.

The distance  $l$  is determined as follows:

**5.2.4.1 Flanged joints with holes outside the enclosure** (see Figures 4 and 6)

The distance  $l$  is measured between each hole and the inside of the enclosure.

**5.2.4.2 Flanged joints with holes inside the enclosure** (see Figure 5)

The distance  $l$  is measured between each hole and the outside of the enclosure.

**5.2.4.3 Spigot joints where, to the edges of the holes, the joint consists of a cylindrical part and a plane part** (see Figure 7)

The distance  $l$  is:

- the sum of the width  $a$  of the cylindrical part and the width  $b$  of the plane part, if  $f$  is less than or equal to 1 mm and if the gap of the cylindrical part is less than or equal to 0,2 mm for electrical apparatus of Groups I and IIA, 0, 15 mm for electrical apparatus of Group IIB, or 0, 1 mm for electrical apparatus of Group IIC (reduced gap);
- the width  $b$  of the plane part alone, if either of the above-mentioned conditions is not met.

**5.2.4.4 Spigot joints where, to the edges of the holes, the joint consists only of the plane part** (see Figure 8 and Figure 9), in so far as plane joints are permitted (see 5.2.7)

The distance  $l$  is the width of the plane part between the inside of the enclosure and a hole, where the hole is outside the enclosure (see Figure 8), or between a hole and the outside of the enclosure where the hole is inside the enclosure (see Figure 9).

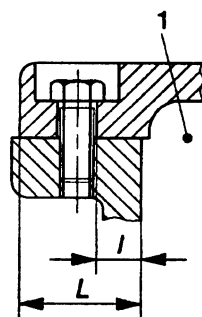


Figure 4

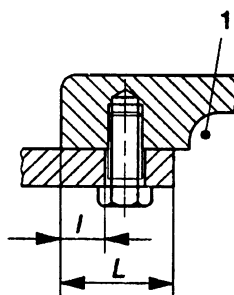


Figure 5

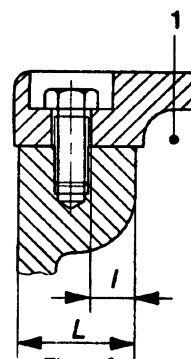


Figure 6

1 Interior of enclosure

Figures 4, 5, 6 — Holes in surfaces of flanged joints

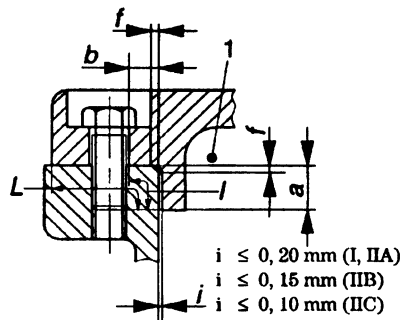


Figure 7

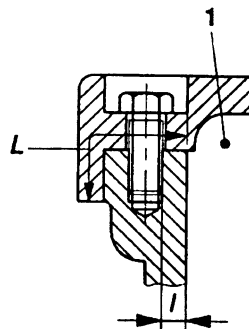


Figure 8

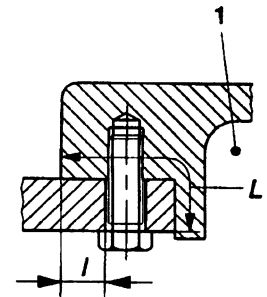


Figure 9

1 Interior of enclosure

Figures 7, 8, 9 — Holes in surfaces of spigot joints