INTERNATIONAL STANDARD

IEC 60079-1

Fifth edition
2003-11

Electrical apparatus for explosive gas atmospheres –

Part 1: Flameproof enclosures "d"

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*

Reference number
IEC 60079-1:2003(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE XB

For price, see current catalogue

TC 31/Publication 60079-1 (2003), Fifth edition/I-SH 01

ELECTRICAL APPARATUS FOR EXPLOSIVE GAS AMOSPHERES – Part 1: Flameproof enclosures "d"

INTERPRETATION SHEET

This interpretation sheet has been prepared by IEC technical committee 31: Electrical apparatus for explosive atmospheres.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
31/656/ISH	31/666/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

Subclause 8.2.2 – Rolling element bearings

It is understood that, with assemblies, all parts will not exist at the worst case dimensions simultaneously. Also a statistical treatment of the tolerances, such as “RMS”, may be required for *m* and *k* verification.

Furthermore, it is understood that it is not a requirement of this standard that the manufacturer’s *m* and *k* calculations be verified. Also, it is not a requirement of this standard that *m* and *k* be verified by measurement.

Subclauses 15.2.1.1, 15.2.2.1 and 15.2.2.2:

When preparing a test sample employing a cylindrical joint of a shaft gland for a rotating machine with roller element bearings, it is understood that the test gap i_E is based on the diametrical clearance from Table 1 or Table 2, and not the radial clearance of 8.2.2.

NOTE This clarification is being introduced in IEC 60079-1 Edition 6 and therefore an Interpretation Sheet will not be required for this or future editions.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –

Part 1: Flameproof enclosures "d"

FOREWORD

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International Standard IEC 60079-1 has been prepared by subcommittee 31A: Flameproof enclosures, of IEC technical committee 31: Electrical apparatus for explosive atmospheres.

This fifth edition cancels and replaces the fourth edition published in 2001 and constitutes a technical revision.

This edition contains the following significant technical changes with regard to the previous edition:

a) revisions to Clause 5 regarding the use of corrosion inhibiting grease, and regarding electroplating of joint surfaces;
b) revisions to Clause 5 regarding gaps whose dimensions are less than required in the tables, and regarding taper threaded joints;
c) revisions to Clause 13 regarding entries for flameproof enclosures;

d) revisions to Clause 13 regarding cable glands and conduit entries;

e) revisions to Clause 14 regarding test voltage for motors;

f) revisions to Clause 15 regarding type tests for apparatus used at an ambient temperature below –20 °C, or at an ambient temperature above 60 °C;

g) revisions to Clause 16 regarding routine tests for apparatus used at an ambient temperature below –20 °C;

h) revisions to Clause 19 regarding non-metallic enclosures;

i) revisions to Annex C regarding Ex blanking elements and thread adapters;

j) addition of a new normative Annex D regarding empty flameproof enclosures as Ex components; and

k) addition of a new normative Annex E regarding cells and batteries.

The text of this standard is based on the following documents:

FDIS	Report on voting
31A/114/FDIS	31A/115/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This standard is to be read in conjunction with IEC 60079-0, the requirements of which apply to electrical apparatus with flameproof enclosures.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –

Part 1: Flameproof enclosures “d”

1 Scope

This part of IEC 60079 contains specific requirements for the construction and testing of electrical apparatus with the type of protection flameproof enclosure “d”, intended for use in explosive gas atmospheres.

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 60034-1:1996, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety*

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

IEC 60079-1-1:2002, *Electrical apparatus for explosive gas atmospheres – Part 1-1: Flameproof enclosures “d” – Method of test for ascertainment of maximum experimental safe gap*

IEC 60079-7:2001, *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 60086-1:2000, *Primary batteries – Part 1: General*

IEC 60112:1979, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127 (all parts), *Miniature fuses*

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

IEC 60707:1981, *Flammability of solid non-metallic materials when exposed to flame sources – List of test methods*

ISO 185:1988, *Grey cast iron – Classification*

ISO 965-1:1998, *ISO general-purpose metric screw threads – Tolerances – Part 1: Principles and basic data*

ISO 965-3:1998, *ISO general-purpose metric screw threads – Tolerances – Part 3: Deviations for constructional threads*

ISO 1210:1982, *Plastics – Determination of the burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source*

ISO 2738:1999, *Sintered metal materials, excluding hard metals – 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 6892:1998, *Metallic materials – Tensile testing at ambient temperature*

ANSI/ASME B1.20.1-1983 (R2001), *Pipe threads, general purpose (inch)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, in addition to those given in IEC 60079-0, apply.

3.1
flameproof enclosure "d"
enclosure in which the parts which can ignite an explosive atmosphere are placed and 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
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
place where the corresponding surfaces of two parts of an enclosure, or the conjunction of enclosures, come together, , and which prevents the transmission of an internal explosion to the explosive atmosphere surrounding the enclosure

3.4
width of flameproof joint
L
shortest path through a flameproof joint from the inside to the outside of an enclosure

3.5
distance
l
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
distance between the corresponding surfaces of a flameproof joint when the electrical apparatus enclosure has been assembled

NOTE 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 (for an explosive mixture)
MESG
maximum gap of a joint of 25 mm in width which prevents any transmission of an explosion during 10 tests made under the conditions specified in IEC 60079-1-1

3.8
shaft
part of circular cross-section used for the transmission of rotary movement

3.9
operating rod
part used for the transmission of control movements which may be rotary or linear or a combination of the two

3.10
pressure-piling
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
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
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
door or cover which is assembled to a flameproof enclosure by a threaded flameproof joint

3.14
breathing device
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
integral or separable part of a flameproof enclosure designed to permit water formed by condensation to escape from the enclosure

3.16
Ex blanking element
threaded blanking element tested separately from the apparatus enclosure but having an apparatus certificate and which is intended to be fitted to the apparatus enclosure without further consideration

NOTE 1 This does not preclude a component certificate for blanking elements in accordance with IEC 60079-0. Examples of blanking elements are shown in Figure 22.

NOTE 2 Non-threaded blanking elements are not apparatus.

3.17
Ex thread adapter
thread adapter tested separately from the enclosure but having an apparatus certificate and which is intended to be fitted to the apparatus enclosure without further consideration

NOTE This does not preclude a component certificate for thread adapters in accordance with IEC 60079-0. Examples of thread adapters are shown in Figure C.2.

4 Apparatus grouping and temperature classification

The apparatus grouping and temperature classification defined in IEC 60079-0 for the use of electrical apparatus in explosive gas atmospheres apply to flameproof enclosures. The subdivisions A, B and C for electrical apparatus of Group II also apply.

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.

The dimensions given in Tables 1, 2, 3 and 4 form part of the specifications of this standard and constitute the minimum 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.

Coating with paint or powder-coat finish 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.

A corrosion inhibiting grease may be applied to joint surfaces before assembly. The grease, if applied, shall be of a type that does not harden because of ageing, does not contain an evaporating solvent, and does not cause corrosion of the joint surfaces. Verification of suitability shall be in accordance with the grease manufacturer's specifications.

Joint surfaces may be electroplated. The metal plating, if applied, shall not be more than 0,008 mm thick.