

Explosive atmospheres —

Part 5: Equipment protection by powder filling “q”

ICS 29.260.20

National foreword

This British Standard is the UK implementation of EN 60079-5:2007. It is identical to IEC 60079-5:2007. It supersedes BS EN 50017:1998, which will be withdrawn on 1 November 2010.

The UK participation in its preparation was entrusted to Technical Committee GEL/31, Equipment for explosive atmospheres.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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English version

**Explosive atmospheres -
Part 5: Equipment protection by powder filling "q"
(IEC 60079-5:2007)**

Atmosphères explosives -
Partie 5: Protection du matériel
par remplissage pulvérulent "q"
(CEI 60079-5:2007)

Explosionsfähige Atmosphäre -
Teil 5: Geräteschutz durch
Sandkapselung "q"
(IEC 60079-5:2007)

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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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

The text of document 31/675/FDIS, future edition 3 of IEC 60079-5, prepared by IEC TC 31, Equipment for explosive atmospheres, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60079-5 on 2007-11-01.

This European Standard supersedes EN 50017:1998.

This European Standard is to be read in conjunction with EN 60079-0:2006.

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) 2008-08-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2010-11-01

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

Annexes ZA and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60079-5:2007 was approved by CENELEC as a European Standard without any modification.

CONTENTS

1	Scope	4
2	Normative references	4
3	Terms and definitions	5
4	Constructional requirements	5
4.1	Enclosure	5
4.2	Filling material	6
4.3	Distances	7
4.4	Materials used for support of energized parts	8
4.5	External field-wiring connections	8
4.6	Capacitors	8
4.7	Cells and batteries	8
4.8	Temperature limitations	9
4.9	Temperature limitations under fault conditions	9
5	Verifications and tests	12
5.1	Type verifications and tests	12
5.2	Routine verifications and tests	13
6	Marking	14
7	Instructions	14
	Annex A (informative) Introduction of an alternative risk assessment method encompassing 'equipment protection levels' for Ex equipment	16
	Annex ZA (normative) Normative references to international publications with their corresponding European publications	22
	Annex ZZ (informative) Coverage of Essential Requirements of EC Directives	23
	Bibliography	21
	Figure 1 – Test arrangement for the dielectric strength test of the filling material	15
	Table 1 – Distances through the filling material	7
	Table 2 – Creepage distances and distances through filling material	11
	Table A.1 – Traditional relationship of EPLs to zones (no additional risk assessment)	18
	Table A.2 – Description of risk of ignition protection provided	19

EXPLOSIVE ATMOSPHERES –**Part 5: Equipment protection by powder filling “q”****1 Scope**

This part of IEC 60079 contains specific requirements for the construction, testing and marking of electrical equipment, parts of electrical equipment and Ex components in the type of protection powder filling “q”, intended for use in explosive gas atmospheres.

NOTE 1 Electrical equipment and Ex components protected by powder filling “q” may contain electronic circuits, transformers, protection fuses, relays, intrinsically safe electrical apparatus, associated electrical apparatus, switches, etc.

NOTE 2 Type of protection powder filling “q” provides equipment protection level (EPL) Gb. For further information, see Annex A.

This standard supplements and modifies the general requirements of IEC 60079-0. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirement of this standard will take precedence.

This standard applies to electrical equipment, parts of electrical equipment and Ex components with:

- a rated supply current less than or equal to 16 A;
- a rated supply voltage less than or equal to 1 000 V;
- a rated power consumption less than or equal to 1 000 W.

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 60079-0:2004, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements*

IEC 60079-1, *Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosure “d”*

IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety “e”*

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”*

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

ISO 3310-1, *Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth*

ISO 3310-2, *Test sieves – Technical requirements and testing – Part 2: Test sieves of perforated plates*

ISO 2591-1, *Test sieving – Methods using test sieves of woven wire cloth and perforated metal plate*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply; they supplement the terms and definitions given in IEC 60079-0.

NOTE Additional definitions applicable to explosive atmospheres can be found in IEC 60050-426.

3.1

powder filling “q”

type of protection in which the parts capable of igniting an explosive gas atmosphere are fixed in position and completely surrounded by filling material to prevent the ignition of an external explosive gas atmosphere

NOTE The type of protection may not prevent the surrounding explosive gas atmosphere from penetrating into the equipment and components and being ignited by the circuits. However, due to the small free volumes in the filling material and due to the quenching of a flame which may propagate through the paths in the filling material, an external explosion is prevented.

3.2

filling material

solid quartz or solid glass particles

3.3

distance through filling material

shortest distance through a filling material between two conductive parts

4 Constructional requirements

4.1 Enclosure

In addition to the enclosure requirements of IEC 60079-0, the following requirements apply.

4.1.1 Closing and sealing

Enclosures of electrical equipment, parts of electrical equipment or Ex components protected by powder filling “q” shall be filled and sealed at the time of manufacture. The closing and sealing shall be the methods of 4.1.1.1 or 4.1.1.2.

4.1.1.1 Enclosures permanently sealed at the time of manufacture

The enclosure shall be permanently sealed at the time of manufacture and shall not be capable of being opened without leaving visible evidence that the enclosure has been opened. The enclosure shall be marked in accordance with 6 a).

4.1.1.2 Enclosures intended to be opened for repair

Electrical equipment, parts of electrical equipment, or Ex components that are designed to be repaired shall incorporate sealing methods that are capable of being renewed without damage to the enclosure when the equipment is repaired, re-filled, and re-sealed. The enclosure shall be marked in accordance with 6 b).

NOTE Suitable techniques that may provide visible evidence of being opened are, for example, welding, soldering, cemented joints, rivets, cementing of screws, or lead-seal safety-wiring of screws.

4.1.2 Pressure test of enclosure

The electrical equipment, parts of electrical equipment or Ex components protected by powder filling “q” shall meet the pressure test requirements specified in 5.1.1.

4.1.3 Degree of protection of the enclosure

The enclosure of the electrical equipment, parts of electrical equipment, or Ex components protected by powder filling “q”, in its normal service condition, i.e. with all openings closed as in normal use, shall comply at least with the degree of protection IP54 as defined in IEC 60529. If the degree of protection is IP55 or higher, the enclosure shall be provided with a breathing device. The enclosure with the breathing device in place shall comply at least with the degree of protection IP54 according to IEC 60529. The test shall be conducted on an empty enclosure without the powder filling installed. At the end of any water ingress tests, no water shall be visible inside the enclosure.

NOTE 1 It is acknowledged that the enclosure may need to be destroyed in order to determine the entrance of dust or water. Two separate test samples may be required.

The ingress protection of enclosures or parts of electrical equipment protected by powder filling “q”, intended for use only in clean, dry rooms, may be reduced to degree of protection IP43. These enclosures shall be marked with the symbol “X” in accordance with 29.2 i) of IEC 60079-0 and the specific conditions for use shall detail the restrictions of use.

When Ex components protected by powder filling “q” are intended to be mounted inside another enclosure complying with IEC 60079-0, this outer enclosure shall have a degree of protection of at least IP54. The IP of the inner enclosure does not need to be specified provided that the Ex component is mounted in a position where it is unlikely to be contaminated by any small amounts of water that may enter the outer enclosure.

The maximum gap of an enclosure protected by powder filling “q” shall be at least 0,1 mm smaller than the specified smallest dimension of the filling material.

NOTE 2 The restriction on the size of the gap is intended to reduce the escape of filling material.

4.1.4 Filling procedure

Filling shall be carried out so as not to leave any void within the filling material (for example by shaking down). The free space within electrical equipment, parts of electrical equipment or Ex components protected by powder filling “q” shall be effectively filled with filling material (see also 4.3.2).

4.2 Filling material

4.2.1 Requirements

The material shall be tested dry in accordance with ISO 2591-1, using a 1 mm nominal aperture sieve in accordance with ISO 3310-1 or ISO 3310-2 and a 500 µm nominal aperture sieve in accordance with ISO 3310-1.