

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Explosive atmospheres –  
Part 0: Equipment – General requirements**

**Atmosphères explosives –  
Partie 0: Matériel – Exigences générales**



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**EXPLOSIVE ATMOSPHERES –****Part 0: Equipment – General requirements**

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International Standard IEC 60079-0 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This sixth edition cancels and replaces the fifth edition, published in 2007, and constitutes a full technical revision.

The significant changes with respect to the previous edition are listed below:

- Relocation of definitions for energy limitation parameters to IEC 60079-11
- Addition of note to clarify that the non-metallic “enclosure” requirements are applied to other than “enclosures” by some of the subparts
- Expansion of material specification data for plastics and elastomers, including UV resistance
- Addition of alternative qualification for O-rings
- Addition of alternative criteria for surface resistance

- Addition of breakdown voltage limit for non-metallic layers applied to metallic enclosures
- Expansion of “X” marking options for non-metallic enclosure materials not meeting basic electrostatic requirements
- Clarification that non-metallic enclosure requirements also apply to painted or coated metal enclosures
- Clarification of test to determine capacitance of accessible metal parts with reduction in acceptable capacitance
- Addition of limits on zirconium content for Group III and Group II (Gb only) enclosures
- Introduction of “X” marking for Group III enclosures not complying with basic material requirements, similar to that existing for Group II
- Addition of button-head cap screws to permitted “Special Fasteners”
- Reference for protective earthing (PE) requirements for electrical machines to IEC 60034-1
- Clarification of terminology for cable glands, blanking elements, and thread adapters
- Addition of requirements for ventilating fans
- Addition of alternative construction for disconnectors
- Removal of voltage limits on plugs and sockets
- Addition of test requirements for arc-quenching test on plugs and sockets
- Update of cell and battery information to reflect latest standards
- Revision to impact test of glass parts
- Revision to impact test procedure to address “bounce” of impact head
- Clarification of the test requirements for “service” and “surface” temperature
- Addition of temperature rise tests for converter-fed motors
- Addition of alternative test method for thermal endurance
- Removal of “charging test” and addition of note providing guidance
- Clarification of test for the measurement of capacitance
- Addition of a “Schedule of Limitations” to certificates for Ex Components
- Clarification of the marking for multiple temperature classes
- Addition of marking for converter-fed motors
- Removal of IP marking for Group III
- Addition of specific instructions for electrical machines
- Addition of specific instructions for ventilating fans
- Update to informative Annex D on converter-fed motors
- Update to informative Annex E on temperature testing of motors
- Addition of informative Annex F, flowchart for testing of non-metallic enclosures and non-metallic parts of enclosures

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

FDIS	Report on voting
31/922/FDIS	31/939/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.

A list of all parts of the IEC 60079 series, under the general title *Explosive atmospheres*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of a new edition.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

## EXPLOSIVE ATMOSPHERES –

### Part 0: Equipment – General requirements

#### 1 Scope

This part of IEC 60079 specifies the general requirements for construction, testing and marking of electrical equipment and Ex Components intended for use in explosive atmospheres.

The standard atmospheric conditions (relating to the explosion characteristics of the atmosphere) under which it may be assumed that electrical equipment can be operated are:

- temperature  $-20\text{ °C}$  to  $+60\text{ °C}$ ;
- pressure 80 kPa (0,8 bar) to 110 kPa (1,1 bar); and
- air with normal oxygen content, typically 21 % v/v.

This standard and other standards supplementing this standard specify additional test requirements for equipment operating outside the standard temperature range, but further additional consideration and additional testing may be required for equipment operating outside the standard atmospheric pressure range and standard oxygen content, particularly with respect to types of protection that depend on quenching of a flame such as 'flameproof enclosure "d"' (IEC 60079-1) or limitation of energy, 'intrinsic safety "i"' (IEC 60079-11).

NOTE 1 Although the standard atmospheric conditions above give a temperature range for the atmosphere of  $-20\text{ °C}$  to  $+60\text{ °C}$ , the normal ambient temperature range for the equipment is  $-20\text{ °C}$  to  $+40\text{ °C}$ , unless otherwise specified and marked. See 5.1.1. It is considered that  $-20\text{ °C}$  to  $+40\text{ °C}$  is appropriate for most equipment and that to manufacture all equipment to be suitable for a standard atmosphere upper ambient temperature of  $+60\text{ °C}$  would place unnecessary design constraints.

NOTE 2 Requirements given in this standard result from an ignition hazard assessment made on electrical equipment. The ignition sources taken into account are those found associated with this type of equipment, such as hot surfaces, mechanically generated sparks, mechanical impacts resulting in thermite reactions, electrical arcing and static electric discharge in normal industrial environments.

NOTE 3 It is acknowledged that, with developments in technology, it may be possible to achieve the objectives of the IEC 60079 series of standards in respect of explosion prevention by methods that are not yet fully defined. Where a manufacturer wishes to take advantage of such developments, this International Standard, as well as other standards in the IEC 60079 series, may be applied in part. It is intended that the manufacturer prepare documentation that clearly defines how the IEC 60079 series of standards has been applied, together with a full explanation of the additional techniques employed. The designation "Ex s" has been reserved to indicate special protection. A standard for special protection "s", IEC 60079-33, is in preparation.

NOTE 4 Where an explosive gas atmosphere and a combustible dust atmosphere are, or may be, present at the same time, the simultaneous presence of both should be considered and may require additional protective measures.

This standard does not specify requirements for safety, other than those directly related to the explosion risk. Ignition sources like adiabatic compression, shock waves, exothermic chemical reaction, self ignition of dust, naked flames and hot gases/liquids, are not addressed by this standard.

NOTE 5 Such equipment should be subjected to a hazard analysis that identifies and lists all of the potential sources of ignition by the electrical equipment and the measures to be applied to prevent them becoming effective.

This standard is supplemented or modified by the following standards concerning specific types of protection:

- IEC 60079-1: Gas – Flameproof enclosures "d";
- IEC 60079-2: Gas – Pressurized enclosures "p";

- IEC 60079-5: Gas – Powder filling "q";
- IEC 60079-6: Gas – Oil immersion "o";
- IEC 60079-7: Gas – Increased safety "e";
- IEC 60079-11: Gas – Intrinsic safety "i";
- IEC 60079-15: Gas – Type of protection "n";
- IEC 60079-18: Gas and dust – Encapsulation "m";
- IEC 60079-31: Dust – Protection by enclosure "t"
- IEC 61241-4: Dust – Pressurization "pD".

NOTE 6 Additional information on types of protection for non-electrical equipment can be found in ISO/IEC 80079-36 (to be published).

This standard is supplemented or modified by the following equipment standards:

IEC 60079-13: Explosive atmospheres – Part 13: Equipment protection by pressurized room "p"

IEC 60079-25: Explosive atmospheres – Part 25: Intrinsically safe electrical systems

IEC 60079-26: Explosive atmospheres – Part 26: Equipment with equipment protection level (EPL) Ga

IEC 60079-28: Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation

IEC 62013-1: Caplights for use in mines susceptible to firedamp – Part 1: General requirements – Construction and testing in relation to the risk of explosion

IEC 60079-30-1: Explosive atmospheres – Part 30-1: Electrical resistance trace heating – General and testing requirements.

This standard with the additional standards mentioned above, are not applicable to the construction of

- electromedical apparatus,
- shot-firing exploders,
- test devices for exploders, and
- shot-firing circuits.

## 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, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5, *Rotating electrical machines – Part 5: Classification of degrees of protection provided by the enclosures of rotating electrical machines (IP Code)*

IEC 60050-426, *International Electrotechnical Vocabulary (IEV) – Chapter 426: Electrical apparatus for explosive atmospheres*

IEC 60079-1, *Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure "d"*

IEC 60079-2, *Explosive atmospheres – Part 2: Equipment protection by pressurized enclosures "p"*

IEC 60079-5, *Explosive atmospheres – Part 5: Equipment protection by powder filling "q"*

IEC 60079-6, *Explosive atmospheres – Part 6: Equipment protection by oil-immersion "o"*

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 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60079-18, *Explosive atmospheres – Part 18: Equipment protection by encapsulation "m"*

IEC 60079-20-1, *Explosive Atmosphere – Part 20-1: Material characteristics for gas and vapour classification, test methods and data*

IEC 60079-25: *Explosive atmospheres – Part 25: Intrinsically safe systems*

IEC 60079-26: *Explosive atmospheres – Part 26: Equipment with equipment protection level (EPL) Ga*

IEC 60079-28: *Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation*

IEC 60079-30-1: *Explosive atmospheres – Part 30-1: Electrical resistance trace heating – General and testing requirements*

IEC 60079-31, *Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosures "t"*

IEC 60086-1, *Primary batteries – Part 1: General*

IEC 60095-1, *Lead-acid starter batteries – Part 1: General requirements and methods of test*

IEC 60192, *Low-pressure sodium vapour lamps – Performance specifications*

IEC 60216-1, *Electrical insulating materials – Properties of thermal endurance – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-2, *Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

IEC 60243-1, *Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60254 (all parts), *Lead-acid traction batteries*

IEC 60423, *Conduits for electrical purposes – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

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

IEC 60622, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Sealed nickel-cadmium prismatic rechargeable single cells*

IEC 60623, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells*

IEC 60662, *High-pressure sodium vapour lamps*

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60896-11, *Stationary lead-acid batteries – Part 11: Vented types – General requirements and methods of tests*

IEC 60896-21, *Stationary lead-acid batteries – Part 21: Valve regulated types – Methods of test*

IEC 60952 (all parts), *Aircraft batteries*

IEC 61056-1, *General purpose lead-acid batteries (valve-regulated types) – Part 1: General requirements, functional characteristics – Methods of tests*

IEC 61241-4, *Electrical apparatus for use in the presence of combustible dust – Part 4: Type of protection “pD”*

IEC 61427, *Secondary cells and batteries for photovoltaic energy systems (PVES) – General requirements and methods of test*

IEC 61951-1, *Secondary cells and batteries containing alkaline and other non-acid electrolytes – Portable sealed rechargeable single cells – Part 1: Nickel-cadmium*

IEC 61951-2, *Secondary cells and batteries containing alkaline and other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride*

IEC 61960, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications*

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

ISO 178, *Plastics – Determination of flexural properties*

ISO 179 (all parts), *Plastics – Determination of Charpy impact properties*

ISO 262, *ISO general-purpose metric screw threads – Selected sizes for screws, bolts and nuts*

ISO 273, *Fasteners – Clearance holes for bolts and screws*

ISO 286-2, *ISO system of limits and fits – Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO 527-2, *Plastics – Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics*

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

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

ISO 1817, *Rubber, vulcanized – Determination of the effect of liquids*

ISO 3601-1, *Fluid power systems – O-rings – Part 1: Inside diameters, cross-sections, tolerances and designation codes*

ISO 3601-2, *Fluid power systems – O-rings – Part 2: Housing dimensions for general applications*

ISO 4014, *Hexagon head bolts – Product grades A and B*

ISO 4017, *Hexagon head screws – Product grades A and B*

ISO 4026, *Hexagon socket set screws with flat point*

ISO 4027, *Hexagon socket set screws with cone point*

ISO 4028, *Hexagon socket set screws with dog point*

ISO 4029, *Hexagon socket set screws with cup point*

ISO 4032, *Hexagon nuts, style 1 – Product grades A and B*

ISO 4762, *Hexagon socket head cap screws*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 7380, *Hexagon socket button head screws*

ISO 14583, *Hexalobular socket pan head screws*

ANSI/UL 746B, *Polymeric Materials – Long-Term Property Evaluations*

ANSI/UL 746C, *Polymeric Materials – Used in Electrical Equipment Evaluations*

### **3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

NOTE For the definitions of any other terms, particularly those of a more general nature, reference should be made to IEC 60050(426) or other appropriate parts of the IEC (International Electrotechnical Vocabulary).