

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Explosive atmospheres –
Part 11: Equipment protection by intrinsic safety "i"**

**Atmosphères explosives –
Partie 11: Protection de l'équipement par sécurité intrinsèque «i»**

IEC 60079-11:2006

<https://standards.iteh.ai/standards/iec/43b27fe8-431d-48ed-a847-de26e7a06611/iec-60079-11-2006>



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60079-11
Edition 5.0 2006-07

EXPLOSIVE ATMOSPHERES –

Part 11: Equipment protection by intrinsic safety "i"

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by subcommittee 31G: Intrinsically-safe apparatus, of IEC technical committee 31: Equipment for explosive atmospheres.

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

DISH	Report on voting
31G/310/DISH	31G/313/RVDISH

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.

<https://standards.iteh.ai/catalog/standards/iec/43b23fe8-431d-48ed-a847-de26e7a06611/iec-60079-11-2006>

Background

IEC 60079-11:2006 subclause 10.5.3 b) states the following:

The maximum surface temperature shall be determined as follows:

All current-limiting devices external to the cell or battery shall be short-circuited for the test. Any external sheath (of paper or metal, etc.) not forming part of the actual cell enclosure shall be removed for the test. The temperature shall be determined on the outer enclosure of each cell or battery and the maximum figure taken. The test shall be carried out both with internal current-limiting devices in circuit and with the devices short-circuited using 10 cells in each case. The 10 samples having the internal current-limiting devices short-circuited shall be obtained from the cell/battery manufacturer together with any special instructions or precautions necessary for safe use and testing of the samples.

The intent of the cited paragraphs is to simulate an internal short inside a cell, by shorting the cell's external terminals for the purpose of thermal assessment.

It was found that two details have been misinterpreted in this subclause:

- a) The subjects of this subclause are cells or batteries, while the intent is clearly to simulate internal shorts inside cells and not inside batteries in which case the shorts could be interpreted as being external to the cell(s) within a battery.

- b) It is unclear what constitutes a current limiting device that protects against internal shorts.

A separator with shutdown function may be interpreted as a current limiting device that protects against internal shorts by its function, but since it is a constructional part of the cell that is not removable without invalidating the functionality of the basic cell, it is not a current limiting device for the purposes of implementing the standard. Conversely, a CID (Current interruption device), for example, is a switch that is triggered by increased pressure inside the cell, and the cell's functionality is not invalidated by the absence of the CID.

The reference to internal current limiting devices that protect against internal shorts in edition 6 was included to address unknown future cell technologies which could include such current limiting devices, however at this time no such current limiting devices are known.

Question

For either Level of Protection "ia" or "ib", what are the current limiting devices that are required to be disabled (or equivalent e.g. not fitted, short-circuited or removed) by IEC 60079-11:2006, Subclause 10.5.3 b), and what are the current limiting devices that need not be disabled?

Answer

All discrete protective devices that can be schematically represented as individual devices apart from the cell are to be disabled for the purposes of testing according to IEC 60079-11:2006, Subclause 10.5.3 b), regardless if they are located inside the cell or if they are external to the cell. This includes, but is not limited to resistors, fuses, resettable fuses (NTC, PTC, PPTC), CID (current interruption device), semiconductors, etc.

Features that provide essential cell functions, such as a separator with shutdown function or the ohmic resistance of the electrolyte, are not considered current limiting devices in the sense of this clause and need not be shorted or removed, and such cells can be considered for Level of Protection "ia".

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 11: Equipment protection by intrinsic safety "i"

FOREWORD

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International Standard IEC 60079-11 has been prepared by subcommittee 31G: Intrinsically safe apparatus, of IEC technical committee 31: Equipment for explosive atmospheres.

This fifth edition cancels and replaces the fourth edition published in 1999 and constitutes a full technical revision.

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

- introduction of level of protection "ic" (this level of protection has been introduced to allow removal of the 'energy limitation' concept from 60079-15);
- introduction of Annex F that allows reduction in segregation distance requirements when the pollution degree has been reduced by installation or enclosure;
- introduction of alternative spark test apparatus construction when used with high current circuits;
- introduction of Annex E that provides a method for transient energy test;

- changes in the table of 'Temperature classification of tracks on PCB's' to allow correlation with IPC-2152;
- allowing alternative methods of rating resistors when used to limit the discharge from capacitance;
- introduction of methods to deal with the spark ignition energy consideration when high current low voltage cells and batteries are used;
- introduction of tests to measure the maximum pressure in sealed battery containers;
- introduction of methods to deal with fault application on voltage enhancement IC's;
- introduction of infallible connection methods for SMD's (surface mount devices);
- introduction of alternative methods to deal with the spark ignition energy in circuits with both inductance and capacitance;
- introduction of alternative high voltage test for transformers;
- introduction of methods to assess the reduction of effective capacitance when protected by series resistances;
- introduction of Group I data for permitted short circuit current and permitted capacitance in the tables of Annex A.

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

FDIS	Report on voting
31G/159/FDIS	31G/161/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 standard supplements and modifies the general requirements of IEC 60079-0, except as indicated in Table 1 (see Scope).

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: *Explosives atmospheres*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

The contents of the interpretation sheet 1 of December 2019 have been included in this copy.

EXPLOSIVE ATMOSPHERES –

Part 11: Equipment protection by intrinsic safety "i"

1 Scope

This part of IEC 60079 specifies the construction and testing of intrinsically safe apparatus intended for use in an explosive gas atmosphere and for associated apparatus, which is intended for connection to intrinsically safe circuits which enter such atmospheres.

This type of protection is applicable to electrical apparatus in which the electrical circuits themselves are incapable of causing an explosion in the surrounding explosive atmospheres.

This standard is also applicable to electrical apparatus or parts of electrical apparatus located outside the explosive gas atmosphere or protected by another type of protection listed in IEC 60079-0, where the intrinsic safety of the electrical circuits in the explosive gas atmosphere may depend upon the design and construction of such electrical apparatus or parts of such electrical apparatus. The electrical circuits exposed to the explosive gas atmosphere are evaluated for use in such an atmosphere by applying this standard.

The requirements for intrinsically safe systems are provided in IEC 60079-25. The requirements for intrinsically safe concepts for fieldbus are provided in IEC 60079-27.

This standard supplements and modifies the general requirements of IEC 60079-0, except as indicated in Table 1. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirements of this standard shall take precedence.

If associated apparatus is placed in the explosive gas atmosphere, it must be protected by an appropriate type of protection listed in IEC 60079-0, and then the requirements of that method of protection together with the relevant parts of IEC 60079-0 also apply to the associated apparatus.

Table 1 – Exclusion of specific clauses of IEC 60079-0

Clause or subclause of IEC 60079-0		Intrinsically safe apparatus	Associated apparatus
4.2.2	Group II – Surface temperature marking	Applies	Excluded
5.3	Maximum surface temperature	Applies	Excluded
5.4	Surface temperature and ignition temperature	Applies	Excluded
5.5	Small components	Applies	Excluded
6.3	Opening times	Excluded	Excluded
7.1.1	Applicability	Applies	Excluded
7.1.2	Specification of materials	Applies	Excluded
7.1.3*	Plastic materials	Excluded	Excluded
7.2*	Thermal endurance	Excluded	Excluded
7.3	Electrostatic charges on external non-metallic materials of enclosures	Applies	Excluded
7.3.2	Avoidance of a build-up electrostatic charge	Applies	Excluded
7.4	Threaded holes	Excluded	Excluded

Table 1 (continued)

Clause or subclause of IEC 60079-0		Intrinsically safe apparatus	Associated apparatus
8.1	Material composition	Applies	Excluded
8.2	Threaded holes	Excluded	Excluded
9	Fasteners	Excluded	Excluded
10	Interlocking devices	Excluded	Excluded
11	Bushings	Excluded	Excluded
12	Materials used for cementing	Excluded	Excluded
14	Connection facilities and terminal compartments	Excluded	Excluded
15	Connection facilities for earthing or bonding conductors	Excluded	Excluded
16.5	Conductor temperature	Excluded	Excluded
17	Supplementary requirements for rotating electrical machines	Excluded	Excluded
18	Supplementary requirements for switchgear	Excluded	Excluded
19	Supplementary requirements for fuses	Excluded	Excluded
20	Supplementary requirements for plugs and sockets	Excluded	Excluded
21	Supplementary requirements for luminaires	Excluded	Excluded
22	Supplementary requirements for caplights and handlights	Excluded	Excluded
23.1	Batteries	Applies	Excluded
26.4	Tests of enclosures	Applies	Excluded
26.5.1	Temperature measurement	Applies	Excluded
26.5.2	Thermal shock test	Excluded	Excluded
26.5.3	Small component ignition test	Applies	Excluded
26.6	Torque test for bushings	Excluded	Excluded
26.7*	Non-metallic enclosures or non-metallic parts of enclosures	Excluded	Excluded
26.8*	Thermal endurance to heat	Excluded	Excluded
26.9*	Thermal endurance to cold	Excluded	Excluded
26.10*	Resistance to light	Excluded	Excluded
26.11*	Resistance to chemical agents for Group I electrical apparatus	Excluded	Excluded
26.12	Earth continuity	Excluded	Excluded
26.13	Surface resistance test of parts of enclosures or non-metallic materials	Applies	Excluded
26.14	Charging tests	Applies	Excluded
26.15	Measurement of capacitance	Applies	Excluded
Annex A	Ex cable glands	Excluded	Excluded

* indicates that these requirements apply for 6.1.2a) only.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60079. 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 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety "e"*

IEC 60079-25, *Electrical apparatus for explosive gas atmospheres – Part 25: Intrinsically safe systems*

IEC 60079-27, *Electrical apparatus for explosive gas atmospheres – Part 27: Fieldbus intrinsically safe concept (FISCO) and Fieldbus non-incendive concept (FNICO)*

IEC 60085, *Electrical insulation – Thermal classification*

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

IEC 60127 (all parts), *Miniature fuses*

IEC 60317-3, *Specifications for particular types of winding wires – Part 3: Polyester enamelled round copper wire, class 155*

IEC 60317-7, *Specifications for particular types of winding wires – Part 7: Polyimide enamelled round copper wire, class 220*

IEC 60317-8, *Specifications for particular types of winding wires – Part 8: Polyesterimide enamelled round copper winding wire, class 180*

IEC 60317-13, *Specifications for particular types of winding wires – Part 13: Polyester or polyesterimide overcoated with polyamide-imide enamelled round copper wire, class 200*

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

IEC 60664-1:2002, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*¹⁾

Amendment 1 (2000)

Amendment 2 (2002)

¹⁾ A consolidated edition 1.2 exists, that comprises IEC 60664-1 and its amendments 1 and 2.