

REDLINE VERSION



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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60079-0 Edition 7.0 2017-12

EXPLOSIVE ATMOSPHERES –

Part 0: Equipment – General requirements

INTERPRETATION SHEET 1

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

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

DISH	Report on voting
31/1455/DISH	31/1464/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.

Interpretation sheet of Subclause 16.6 of IEC 60079-0:2017

The TC31/CAG requested (Resolution 2 of 2018-04-19) that WG22 prepare an interpretation sheet based on IECEx Decision Sheet DS2018/002 addressing the assignment of entry point and branching point temperatures of electrical rotating machines.

Details of interpretation:

IEC 60079-0:2017 (Ed. 7), *Explosive atmospheres – Part 0: Equipment – General requirements*

Interpretation of Subclause 16.6: Temperature at branching point and entry point:

Question: Subclause 16.6 of IEC 60079-0:2017 states “When the temperature under rated conditions is higher than 70 °C at the entry point or 80 °C at the branching point of the conductors, information shall be marked on the equipment exterior to provide guidance to the user on the proper selection of cable and cable gland or conductors in conduit.”

It is not normal practice for electrical rotating machines to be tested with the cable entry devices and cables that might be used in an actual installation, but with the cables available at the manufacturer's test area. In many cases, there will be no formal entry device as the cables will enter via the space reserved for fixing of a gland plate.

How shall the relevant entry point and branching point temperatures be determined?

Interpretation: *The use of the maximum internal air space temperature to represent the maximum service temperature of terminal box gaskets and seals, the cable branching point temperature, and the entry point temperature reflects the normal practice of testing electrical rotating machines without prior knowledge of the actual glands and cables to be used for installation. The production of heat from the electrical rotating machine connections is generally insignificant with respect to the production of heat from the machine windings and core.*

Further amplification:

- 1) The entry point of the cable where the temperature is measured should be sealed so far as possible to ensure that there is minimum air-circulation which can reduce the measured temperature.
- 2) This is not intended to apply to any gasket between the terminal box and the frame of the electrical rotating machine, where higher temperatures may be recorded, but only to the gasket between the terminal box and its lid.

Although written in the context of electrical rotating machines, there may be other types of equipment where an equivalent approach is applicable.

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IEC 60079-0 Edition 7.0 2017-12

EXPLOSIVE ATMOSPHERES –

Part 0: Equipment – General requirements

INTERPRETATION SHEET 2

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

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

DISH	Report on voting
31/1469/DISH	31/1486/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.

Question:

How shall marking be shown for equipment covered by both the electrical and non-electrical standards (IEC 60079 and ISO 80079 series)?

Answer:

Equipment which includes both an electrical part and a non-electrical part shall have combined marking. For example:

Ex db h IIA T4 Gb

Ex h tb IIIC T135 °C Db

It will be clearer for the user that the combined risk of the electrical part and the non-electrical part, covered by a single certificate, has been assessed for the complete equipment, stating one EPL, one equipment Group and one temperature class for Gas and the same for Dust (but showing a maximum surface temperature instead of a temperature class). It is also noted that Ex Components are not marked with either a temperature class (Group II) or a maximum surface temperature (Group III).

For equipment where separate certificates have been prepared, with one for the electrical parts, and one for the non-electrical parts, it is appropriate to have separate electrical and non-electrical marking strings, each with its own associated certificate number.

NOTE Additional guidance on the marking of assemblies is given in IEC TS 60079-46.

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

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This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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

This seventh edition cancels and replaces the sixth edition, published in 2011. This edition constitutes a technical revision.

The significance of the changes between IEC Standard, IEC 60079-0, Edition 6 (2011) and IEC 60079-0, Edition 7 (2017) are as listed below:

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Throughout document, “electrical equipment” replaced by “equipment” where appropriate.	Multiple	X		
Scope	1	X		
List of “Type of “Protection” and “Product” standards combined into one list.				
Definitions used in multiple sub-parts added. Definitions harmonized across sub-parts and added to 60079-0 where appropriate. Battery definitions updated	3	X		
Clarification of the way that information on process temperature influences can be expressed.	5.1.2	X		
Clarification regarding the determination of service temperatures when dust layers are present	5.2	X		
Clarification on the need to provide service temperature information for Ex Components in the Schedule of Limitations	5.2	X		
Relocation of EPL Da dust layer requirements from IEC 60079-18 & IEC 60079-31	5.3.2.3.1	A1		
Clarified that for EPL Db, a maximum specified dust layer of greater than 200 mm is not permitted as thicker layers have no additional effect on maximum surface temperature.	b)	X		
Added for EPL Db, a dust layer in a specified orientation, marked as T_L	c)		X	
Clarified that for EPL Dc, no dust layer tests are required.	5.3.2.3.3	X		
Clarified that the “temperature” is the temperature of the air surrounding the component	5.3.3	X		
Subdivided section dealing with higher permitted surface temperatures for “smooth” surfaces. Corrected area from 1 000 mm ² to 10 000 mm ² .	5.3.4	X		
Clarified that the “Ex” requirements of IEC 60079 supplement those of the relevant industrial standards.	6.1	X		
Added requirement that where an adhesive is used to secure a gasket, it shall be used within its COT and shall comply with the requirements for cements.	6.5			C1
Requirements relocated to IEC 60079-28	former 6.6.2	A2		
Ultrasonic requirements updated based on latest research work	6.6.3		X	
Added reference to IEC 60079-28	6.6.4	A2		
Material identification parameters have been revised to reflect reasonably obtainable information	7.1.2.2	X		
“RTI-mechanical” has been clarified to include “RTI-mechanical strength” and “RTI-mechanical impact”	7.1.2.2	X		
Material identification parameters have been revised to reflect reasonably obtainable information	7.1.2.3	X		
Relocated information on “cements” from Clause 12.	7.1.2.4	X		
“RTI-mechanical” has been clarified to include “RTI-mechanical strength” and “RTI-mechanical impact”. Requirements for cements aligned with the requirements for elastomers.	7.2.2	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Relocation of 10 K margin for EPL Gc or Dc from IEC 60079-15, IEC 60079-18 & IEC 60079-31	7.2.2	A3		
Added clarification with respect to gaskets and seals where only the outer edge is potentially exposed to light.	7.3	X		
Clarification added that one or more of the described techniques may be used	7.4.2	X		
Added additional relaxation for the case where a surface is in contact with an earthed surface on only two of four sides.	7.4.2 b)		X	
Added reference to IEC 60243-1 and IEC 60243-2 for test method to require a 4 kV DC test..	7.4.2.c)			C2
Additional guidance added with respect to the possible Specific Conditions of Use	7.4.2 e)	X		
New option added for portable, mains-powered equipment with earth-connected guard	7.4.2 f)		X	
Added option for determination of maximum transferred charge.	7.4.2 g) Table 10		X	
Added missing limits (same as 7.4.2)	7.4.3 a)	X		
Clarified that it is a dc test that is conducted	7.4.3 b)	X		
Clarified that this requirement is not applied to personal or portable equipment	7.5	X		
Clarified Group I limits	8.2	X		
Clarified Group II, EPL Ga limits	8.3	X		
Added limitation for external surfaces of >65% copper	8.5			C3
Added clarification as to what is considered a tool	9.1	X		
Clarified that the tolerance class of the set screw is not critical, only that it not protrude from the threaded hole after tightening.	9.4	X		
Information on cements transferred to Clause 7	12	X		
Required that Ex Component Certificates require a Schedule of Limitations in all cases	13.5		X	
Revised to clarified that all connection facilities may not be a "Compartment".	14	X		
Sub-clause split to separate the requirements for protective earthing and equipotential bonding into separate sections	15.3 15.4	X		
Section split to separate secureness of electrical connections from the internal earth continuity plate.	15.6 15.7	X		
Non-threaded Group I cable glands are no longer required to be Ex Components.	16.3		X	
Non-threaded Group I blanking elements are no longer required to be Ex Components.	16.4		X	
Scope of Clause 17 clarified to define applicability	17	X		
Additional guidance notes added to address bearings	17.3	X		
Clarified applicability to disconnectors, interlocks, and maintenance switches.	18.2	X		
Fuse requirements deleted as they are addressed in the individual sub-parts	19	X		
Added requirements for EPL Gc and Dc	20.1			C4

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
The test circuit requirements for a flameproof connection have been removed as they are more completely specified in IEC 60079-1.	20.2	X		
The impact test requirements for luminaires are relocated to Table 15	21.1 Table 15	X		
Clarified interlock switch operation for flameproof luminaires	21.2	X		
Clarified that some Types of Protection permit connection of cells in parallel	23.2	X		
New cell types and data added based on latest available data	Table 13		X	
New cell types and data added based on latest available data	Table 14			C5
Clarification of what documentation is to be prepared regarding the explosion safety aspects of the equipment	24	X		
Clarification that the type tests are to take into consideration the installation instructions	26.2	X		
Clarification that the “glass” requirements also apply to “ceramic” parts	26.4.1.1	X		
Added a permission to interchange the order of tests at the “lower test temperature” and the “upper test temperature”.	26.4.1.2.2 26.4.1.2.3	X		
Clarified the construction of the impact test fixture	26.4.2	X		
Clarified the impact tests for glass parts	26.4.2	X		
Added clarification to deal with the new IPX9 ratings	26.4.5.1		X	
Clarified the test voltage for maximum surface temperature	26.5.1.3	X		
Relocation of EPL Da dust layer requirements from IEC 60079-18 & IEC 60079-31	26.5.1.3	A1		
Relocation of EPL Db specified dust layer requirements from IEC 60079-31	26.5.1.3	A4		
Added for EPL Db, a dust layer in a specified orientation, marked as 1	26.5.1.3		B1	
Clarified that for EPL DC, the testing is conducted without a dust layer	26.5.1.3	X		
Relocation of thermal endurance to heat 10K relaxation for Gc equipment from IEC 60079-15, IEC 60079-18, & IEC 60079-31	Table 17	X		
Clarification of a consistent way to address elastomeric materials exposed to ultraviolet light	26.10	X		
Replacement of “oil No. 2” with the revised designation of “oil IRM 902”.	26.11	X		
Option added for testing at lower voltages when low resistance materials are encountered	26.13		X	
Transferred charge test added based on IEC TS 60079-32-2	26.17		X	
The reference to a specific instruction document instead of an “X” condition relocated to e) instead of a note giving a permission	29.3 e)	X		
Updated to reflect the additional levels of protection already shown in the sub-parts: “da”, “dc”, “eb”, “ec”, “oc”, “op is”, “op pr”, “op sh”, “pxb”, “pyb”, “pzc”, “qb”, “sa”, “sb”, and “sc”.	29.4 b)	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Text added to address marking of “Ex associated equipment”	29.4		X	
Updated to reflect the additional levels of protection already shown in the sub-parts: “ic”, “op is”, “op pr”, “op sh”, “pxb”, “pyb”, “pzc”, “sa”, “sb”, and “sc”.	29.5 b)	X		
Clarified marking of EPL Da, EPL Db with no dust layer, EPL Db with a specified dust layer, and EPL Dc.	29.5 d)	X		
Introduced marking for EPL Db with a dust layer in a specified orientation	29.5 d)		X	
Text added to address marking of “Ex associated equipment”	29.5		X	
Text added to address marking of equipment intended to be installed in a boundary wall.	29.9		X	
The marking of Ex Component enclosure was aligned with the marking requirements of IEC 60079-1 and IEC 60079-7	29.10	X		
The alternate marking of EPL has been deleted.	former 29.13			C6
Marking for electric machines operated with a converter clarified	29.15	X		
Instruction material guidance clarified	30.1	X		
Additional instruction material for electric machines added	30.3			C7
Additional instruction material for cable glands added	30.5 A.5			C8
Allow ISO 10807 hose assemblies to be used with cable glands.	A.1		X	
Clarify testing with stainless steel mandrels	A.3	X		
Reduction of the time / slippage permitted	A.3.1.1		X	
Clarify impact testing of cable glands	A.3.3 Figure A.3	X		
Clarified the order of tests	A.3.4	X		
Clarified remarks	Annex B	X		
Aligned Figure with text	Figure C.1	X		
Clarified operation of electric machines from converters	Annex D (informative)	X		
Clarified temperature testing of electric machines	Annex E (informative)	X		
Flowchart for Cable Gland testing	Annex G (informative)	X		
Guidance of electric machine shaft voltages	Annex H (informative)	X		

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version. More guidance may be found by referring to the Redline Version of the standard.

Explanations:

A) Definitions

Minor and editorial changes

clarification
decrease of technical requirements
minor technical change
editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

Extension

addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

Major technical changes

addition of technical requirements
increase of technical requirements

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

B) Information about the background of changes

- A1 The dust layer requirements for EPL Da are unchanged from what previously existed in IEC 60079-18, Ed 4 and IEC 60079-31, Ed 2, but have been relocated to IEC 60079-0 to allow consistent application in all Types of Protection.
- A2 IEC 60079-28 now includes all requirements for optical radiation for all EPLs.
- A3 The COT requirements for EPL Gc or Dc are unchanged from what previously existed in IEC 60079-15, Ed 4, IEC 60079-18, Ed 4, and IEC 60079-31, Ed 2, but have been relocated to IEC 60079-0 to allow consistent application in all Types of Protection.
- A4 The dust layer requirements for EPL Db with a specified dust layer depth are unchanged from what previously existed in IEC 60079-31, Ed 2, but have been relocated to IEC 60079-0 to allow consistent application in all Types of Protection.
- B1 Dust layer requirements for EPL Db with a dust layer in a specified orientation have been added.
- C1 It is recognized that the new requirements were, in many cases, already applied. The change is to ensure that they are uniformly and consistently applied.
- C2 Require that the test be conducted at 4 kV DC.
- C3 The limitation applies to external surfaces of other than cable glands, blanking elements, thread adapters and bushings.
- C4 The added requirements for tool securing and marking are consistent with the approach in IEC 60079-15
- C5 Voltage values were changed following additional research due to the complicated assessment and sometimes unspecified construction of Li/Ion-cells. It was found that some voltage values previously stated were too low.

- C6 The now required EPL marking may be other than that permitted by the Level of Protection to account for limiting restrictions of material or plastic material surface area.
- C7 Additional instruction material for electric machines required to facilitate selection, installation, and maintenance.
- C8 Additional instruction material for cable glands required to facilitate selection and installation.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
31/1345/FDIS	31/1356/RVD

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

This document 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.

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

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

The contents of the interpretation sheet 1 of April 2019 and interpretation sheet 2 of June 2019 have been included in this copy.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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~~ Ex 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~~ Ex Equipment can be operated are:

- temperature -20 °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 part of IEC 60079 and other standards supplementing this standard specify additional test requirements for Ex Equipment operating outside the standard temperature range, but further additional consideration and additional testing may be required for Ex Equipment operating outside the standard atmospheric pressure range and standard oxygen content. Such additional testing may be particularly relevant with respect to Types of Protection that depend on quenching of a flame such as flameproof enclosures “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 °C to $+60\text{ °C}$, the normal ambient temperature range for the Ex Equipment is -20 °C to $+40\text{ °C}$, unless otherwise specified and marked. See 5.1.1. It is considered that -20 °C to $+40\text{ °C}$ is appropriate for ~~most many~~ items of Ex Equipment and that to manufacture all Ex 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, ~~electromagnetic radiation~~, mechanically generated sparks, mechanical impacts resulting in thermite reactions, electrical arcing and static electric discharge in normal industrial environments.

~~NOTE 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 3 Where an explosive gas atmosphere and a combustible dust atmosphere are, or ~~may can~~ be, present at the same time, the simultaneous presence of both ~~should be considered and may require~~ often warrants additional protective measures. Additional guidance on the use of Ex Equipment in hybrid mixtures (mixture of a flammable gas or vapour with a combustible dust or combustible flyings) is given in IEC 60079-14.

IEC 60079 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 4 Although outside the scope of this standard, such equipment ~~should would~~ typically 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. See ISO/IEC 80079-36.

This document is supplemented or modified by the following ~~standards concerning specific types of protection~~ parts and technical specifications:

- IEC 60079-1: Gas – Flameproof enclosures “d”;
- IEC 60079-2: Gas and dust – Pressurized enclosures “p”;
- IEC 60079-5: Gas – Powder filling “q”;
- IEC 60079-6: Gas – ~~Oil~~ Liquid immersion “o”;
- IEC 60079-7: Gas – Increased safety “e”;
- IEC 60079-11: Gas and dust – Intrinsic safety “i”;
- IEC 60079-13: Gas and dust – Equipment protection by pressurized room “p” & artificially ventilated room “v”;
- IEC 60079-15: Gas – Type of protection “n”;
- IEC 60079-18: Gas and dust – Encapsulation “m”;
- IEC 60079-25: Gas and dust – Intrinsically safe electrical systems
- IEC 60079-26: Gas – Equipment with equipment protection level (EPL) Ga
- IEC 60079-28: Gas and dust – Protection of equipment and transmission systems using optical radiation
- IEC 60079-29-1: Gas detectors – Performance requirements of detectors for flammable gases
- IEC 60079-29-4: Gas detectors – Performance requirements of open path detectors for flammable gases
- IEC/IEEE 60079-30-1: Gas and dust – Electrical resistance trace heating – General and testing requirements.
- IEC 60079-31: Dust – Protection by enclosure “t”
- ~~– IEC 61241-4: Dust – Pressurization “pD”~~
- IEC 60079-33: Gas and dust – Special protection “s”
- IEC 60079-35-1: Caplights for use in mines susceptible to firedamp – General requirements – Construction and testing in relation to the risk of explosion
- IEC TS 60079-39: Gas – Intrinsically safe systems with electronically controlled spark duration limitation
- IEC TS 60079-40: Gas – Requirements for process sealing between flammable process fluids and electrical systems
- ISO 80079-36: Gas and dust – Non-electrical equipment for explosive atmospheres – Basic method and requirements

~~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 document, along with the additional standards parts of IEC 60079 mentioned above, is not applicable to the construction of

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 integral design of rotating electrical machines (IP Code) – Classification*

~~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 enclosures "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 atmospheres – 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 60079-35-1, *Explosive atmospheres – Part 35-1: Caplights for use in mines susceptible to firedamp – General requirements – Construction and testing in relation to the risk of explosion*

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 properties – 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 systems for electrical purposes cable management – 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 – Performance specifications*

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~~

IEC 62626-1, Low-voltage switchgear and controlgear enclosed equipment – Part 1: Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work

ISO 48, Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)

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*

ASTM D5964, *Standard practice for rubber IRM 901, IRM 902, and IRM 903 replacement oils for ASTM No. 1, ASTM No. 2, and ASTM No. 3*

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60079-0 Edition 7.0 2017-12

EXPLOSIVE ATMOSPHERES –

Part 0: Equipment – General requirements

INTERPRETATION SHEET 1

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

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

DISH	Report on voting
31/1455/DISH	31/1464/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.

Interpretation sheet of Subclause 16.6 of IEC 60079-0:2017

The TC31/CAG requested (Resolution 2 of 2018-04-19) that WG22 prepare an interpretation sheet based on IECEx Decision Sheet DS2018/002 addressing the assignment of entry point and branching point temperatures of electrical rotating machines.

Details of interpretation:

IEC 60079-0:2017 (Ed. 7), *Explosive atmospheres – Part 0: Equipment – General requirements*

Interpretation of Subclause 16.6: Temperature at branching point and entry point:

Question: Subclause 16.6 of IEC 60079-0:2017 states “When the temperature under rated conditions is higher than 70 °C at the entry point or 80 °C at the branching point of the conductors, information shall be marked on the equipment exterior to provide guidance to the user on the proper selection of cable and cable gland or conductors in conduit.”

It is not normal practice for electrical rotating machines to be tested with the cable entry devices and cables that might be used in an actual installation, but with the cables available at the manufacturer's test area. In many cases, there will be no formal entry device as the cables will enter via the space reserved for fixing of a gland plate.

How shall the relevant entry point and branching point temperatures be determined?

Interpretation: *The use of the maximum internal air space temperature to represent the maximum service temperature of terminal box gaskets and seals, the cable branching point temperature, and the entry point temperature reflects the normal practice of testing electrical rotating machines without prior knowledge of the actual glands and cables to be used for installation. The production of heat from the electrical rotating machine connections is generally insignificant with respect to the production of heat from the machine windings and core.*

Further amplification:

- 1) The entry point of the cable where the temperature is measured should be sealed so far as possible to ensure that there is minimum air-circulation which can reduce the measured temperature.
- 2) This is not intended to apply to any gasket between the terminal box and the frame of the electrical rotating machine, where higher temperatures may be recorded, but only to the gasket between the terminal box and its lid.

Although written in the context of electrical rotating machines, there may be other types of equipment where an equivalent approach is applicable.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60079-0 Edition 7.0 2017-12

EXPLOSIVE ATMOSPHERES –

Part 0: Equipment – General requirements

INTERPRETATION SHEET 2

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

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

DISH	Report on voting
31/1469/DISH	31/1486/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.

Question:

How shall marking be shown for equipment covered by both the electrical and non-electrical standards (IEC 60079 and ISO 80079 series)?

Answer:

Equipment which includes both an electrical part and a non-electrical part shall have combined marking. For example:

Ex db h IIA T4 Gb

Ex h tb IIIC T135 °C Db

It will be clearer for the user that the combined risk of the electrical part and the non-electrical part, covered by a single certificate, has been assessed for the complete equipment, stating one EPL, one equipment Group and one temperature class for Gas and the same for Dust (but showing a maximum surface temperature instead of a temperature class). It is also noted that Ex Components are not marked with either a temperature class (Group II) or a maximum surface temperature (Group III).

For equipment where separate certificates have been prepared, with one for the electrical parts, and one for the non-electrical parts, it is appropriate to have separate electrical and non-electrical marking strings, each with its own associated certificate number.

NOTE Additional guidance on the marking of assemblies is given in IEC TS 60079-46.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 0: Equipment – General requirements

FOREWORD

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

This seventh edition cancels and replaces the sixth edition, published in 2011. This edition constitutes a technical revision.

The significance of the changes between IEC Standard, IEC 60079-0, Edition 6 (2011) and IEC 60079-0, Edition 7 (2017) are as listed below:

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Throughout document, “electrical equipment” replaced by “equipment” where appropriate.	Multiple	X		
Scope	1	X		
List of “Type of “Protection” and “Product” standards combined into one list.				
Definitions used in multiple sub-parts added. Definitions harmonized across sub-parts and added to 60079-0 where appropriate. Battery definitions updated	3	X		
Clarification of the way that information on process temperature influences can be expressed.	5.1.2	X		
Clarification regarding the determination of service temperatures when dust layers are present	5.2	X		
Clarification on the need to provide service temperature information for Ex Components in the Schedule of Limitations	5.2	X		
Relocation of EPL Da dust layer requirements from IEC 60079-18 & IEC 60079-31	5.3.2.3.1	A1		
Clarified that for EPL Db, a maximum specified dust layer of greater than 200 mm is not permitted as thicker layers have no additional effect on maximum surface temperature.	b)	X		
Added for EPL Db, a dust layer in a specified orientation, marked as T_L	c)		X	
Clarified that for EPL Dc, no dust layer tests are required.	5.3.2.3.3	X		
Clarified that the “temperature” is the temperature of the air surrounding the component	5.3.3	X		
Subdivided section dealing with higher permitted surface temperatures for “smooth” surfaces. Corrected area from 1 000 mm ² to 10 000 mm ² .	5.3.4	X		
Clarified that the “Ex” requirements of IEC 60079 supplement those of the relevant industrial standards.	6.1	X		
Added requirement that where an adhesive is used to secure a gasket, it shall be used within its COT and shall comply with the requirements for cements.	6.5			C1
Requirements relocated to IEC 60079-28	former 6.6.2	A2		
Ultrasonic requirements updated based on latest research work	6.6.3		X	
Added reference to IEC 60079-28	6.6.4	A2		
Material identification parameters have been revised to reflect reasonably obtainable information	7.1.2.2	X		
“RTI-mechanical” has been clarified to include “RTI-mechanical strength” and “RTI-mechanical impact”	7.1.2.2	X		
Material identification parameters have been revised to reflect reasonably obtainable information	7.1.2.3	X		
Relocated information on “cements” from Clause 12.	7.1.2.4	X		
“RTI-mechanical” has been clarified to include “RTI-mechanical strength” and “RTI-mechanical impact”. Requirements for cements aligned with the requirements for elastomers.	7.2.2	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Relocation of 10 K margin for EPL Gc or Dc from IEC 60079-15, IEC 60079-18 & IEC 60079-31	7.2.2	A3		
Added clarification with respect to gaskets and seals where only the outer edge is potentially exposed to light.	7.3	X		
Clarification added that one or more of the described techniques may be used	7.4.2	X		
Added additional relaxation for the case where a surface is in contact with an earthed surface on only two of four sides.	7.4.2 b)		X	
Added reference to IEC 60243-1 and IEC 60243-2 for test method to require a 4 kV DC test..	7.4.2.c)			C2
Additional guidance added with respect to the possible Specific Conditions of Use	7.4.2 e)	X		
New option added for portable, mains-powered equipment with earth-connected guard	7.4.2 f)		X	
Added option for determination of maximum transferred charge.	7.4.2 g) Table 10		X	
Added missing limits (same as 7.4.2)	7.4.3 a)	X		
Clarified that it is a dc test that is conducted	7.4.3 b)	X		
Clarified that this requirement is not applied to personal or portable equipment	7.5	X		
Clarified Group I limits	8.2	X		
Clarified Group II, EPL Ga limits	8.3	X		
Added limitation for external surfaces of >65% copper	8.5			C3
Added clarification as to what is considered a tool	9.1	X		
Clarified that the tolerance class of the set screw is not critical, only that it not protrude from the threaded hole after tightening.	9.4	X		
Information on cements transferred to Clause 7	12	X		
Required that Ex Component Certificates require a Schedule of Limitations in all cases	13.5		X	
Revised to clarified that all connection facilities may not be a "Compartment".	14	X		
Sub-clause split to separate the requirements for protective earthing and equipotential bonding into separate sections	15.3 15.4	X		
Section split to separate secureness of electrical connections from the internal earth continuity plate.	15.6 15.7	X		
Non-threaded Group I cable glands are no longer required to be Ex Components.	16.3		X	
Non-threaded Group I blanking elements are no longer required to be Ex Components.	16.4		X	
Scope of Clause 17 clarified to define applicability	17	X		
Additional guidance notes added to address bearings	17.3	X		
Clarified applicability to disconnectors, interlocks, and maintenance switches.	18.2	X		
Fuse requirements deleted as they are addressed in the individual sub-parts	19	X		
Added requirements for EPL Gc and Dc	20.1			C4

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
The test circuit requirements for a flameproof connection have been removed as they are more completely specified in IEC 60079-1.	20.2	X		
The impact test requirements for luminaires are relocated to Table 15	21.1 Table 15	X		
Clarified interlock switch operation for flameproof luminaires	21.2	X		
Clarified that some Types of Protection permit connection of cells in parallel	23.2	X		
New cell types and data added based on latest available data	Table 13		X	
New cell types and data added based on latest available data	Table 14			C5
Clarification of what documentation is to be prepared regarding the explosion safety aspects of the equipment	24	X		
Clarification that the type tests are to take into consideration the installation instructions	26.2	X		
Clarification that the “glass” requirements also apply to “ceramic” parts	26.4.1.1	X		
Added a permission to interchange the order of tests at the “lower test temperature” and the “upper test temperature”.	26.4.1.2.2 26.4.1.2.3	X		
Clarified the construction of the impact test fixture	26.4.2	X		
Clarified the impact tests for glass parts	26.4.2	X		
Added clarification to deal with the new IPX9 ratings	26.4.5.1		X	
Clarified the test voltage for maximum surface temperature	26.5.1.3	X		
Relocation of EPL Da dust layer requirements from IEC 60079-18 & IEC 60079-31	26.5.1.3	A1		
Relocation of EPL Db specified dust layer requirements from IEC 60079-31	26.5.1.3	A4		
Added for EPL Db, a dust layer in a specified orientation, marked as 1	26.5.1.3		B1	
Clarified that for EPL DC, the testing is conducted without a dust layer	26.5.1.3	X		
Relocation of thermal endurance to heat 10K relaxation for Gc equipment from IEC 60079-15, IEC 60079-18, & IEC 60079-31	Table 17	X		
Clarification of a consistent way to address elastomeric materials exposed to ultraviolet light	26.10	X		
Replacement of “oil No. 2” with the revised designation of “oil IRM 902”.	26.11	X		
Option added for testing at lower voltages when low resistance materials are encountered	26.13		X	
Transferred charge test added based on IEC TS 60079-32-2	26.17		X	
The reference to a specific instruction document instead of an “X” condition relocated to e) instead of a note giving a permission	29.3 e)	X		
Updated to reflect the additional levels of protection already shown in the sub-parts: “da”, “dc”, “eb”, “ec”, “oc”, “op is”, “op pr”, “op sh”, “pxb”, “pyb”, “pzc”, “qb”, “sa”, “sb”, and “sc”.	29.4 b)	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Text added to address marking of “Ex associated equipment”	29.4		X	
Updated to reflect the additional levels of protection already shown in the sub-parts: “ic”, “op is”, “op pr”, “op sh”, “pxb”, “pyb”, “pzc”, “sa”, “sb”, and “sc”.	29.5 b)	X		
Clarified marking of EPL Da, EPL Db with no dust layer, EPL Db with a specified dust layer, and EPL Dc.	29.5 d)	X		
Introduced marking for EPL Db with a dust layer in a specified orientation	29.5 d)		X	
Text added to address marking of “Ex associated equipment”	29.5		X	
Text added to address marking of equipment intended to be installed in a boundary wall.	29.9		X	
The marking of Ex Component enclosure was aligned with the marking requirements of IEC 60079-1 and IEC 60079-7	29.10	X		
The alternate marking of EPL has been deleted.	former 29.13			C6
Marking for electric machines operated with a converter clarified	29.15	X		
Instruction material guidance clarified	30.1	X		
Additional instruction material for electric machines added	30.3			C7
Additional instruction material for cable glands added	30.5 A.5			C8
Allow ISO 10807 hose assemblies to be used with cable glands.	A.1		X	
Clarify testing with stainless steel mandrels	A.3	X		
Reduction of the time / slippage permitted	A.3.1.1		X	
Clarify impact testing of cable glands	A.3.3 Figure A.3	X		
Clarified the order of tests	A.3.4	X		
Clarified remarks	Annex B	X		
Aligned Figure with text	Figure C.1	X		
Clarified operation of electric machines from converters	Annex D (informative)	X		
Clarified temperature testing of electric machines	Annex E (informative)	X		
Flowchart for Cable Gland testing	Annex G (informative)	X		
Guidance of electric machine shaft voltages	Annex H (informative)	X		

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version. More guidance may be found by referring to the Redline Version of the standard.

Explanations:**A) Definitions****Minor and editorial changes**

clarification
decrease of technical requirements
minor technical change
editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

Extension

addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

Major technical changes

addition of technical requirements
increase of technical requirements

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

B) Information about the background of changes

- A1 The dust layer requirements for EPL Da are unchanged from what previously existed in IEC 60079-18, Ed 4 and IEC 60079-31, Ed 2, but have been relocated to IEC 60079-0 to allow consistent application in all Types of Protection.
- A2 IEC 60079-28 now includes all requirements for optical radiation for all EPLs.
- A3 The COT requirements for EPL Gc or Dc are unchanged from what previously existed in IEC 60079-15, Ed 4, IEC 60079-18, Ed 4, and IEC 60079-31, Ed 2, but have been relocated to IEC 60079-0 to allow consistent application in all Types of Protection.
- A4 The dust layer requirements for EPL Db with a specified dust layer depth are unchanged from what previously existed in IEC 60079-31, Ed 2, but have been relocated to IEC 60079-0 to allow consistent application in all Types of Protection.
- B1 Dust layer requirements for EPL Db with a dust layer in a specified orientation have been added.
- C1 It is recognized that the new requirements were, in many cases, already applied. The change is to ensure that they are uniformly and consistently applied.
- C2 Require that the test be conducted at 4 kV DC.
- C3 The limitation applies to external surfaces of other than cable glands, blanking elements, thread adapters and bushings.
- C4 The added requirements for tool securing and marking are consistent with the approach in IEC 60079-15
- C5 Voltage values were changed following additional research due to the complicated assessment and sometimes unspecified construction of Li/Ion-cells. It was found that some voltage values previously stated were too low.

- C6 The now required EPL marking may be other than that permitted by the Level of Protection to account for limiting restrictions of material or plastic material surface area.
- C7 Additional instruction material for electric machines required to facilitate selection, installation, and maintenance.
- C8 Additional instruction material for cable glands required to facilitate selection and installation.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
31/1345/FDIS	31/1356/RVD

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

This document 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.

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

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

The contents of the interpretation sheet 1 of April 2019 and interpretation sheet 2 of June 2019 have been included in this copy.

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EXPLOSIVE ATMOSPHERES –

Part 0: Equipment – General requirements

1 Scope

This part of IEC 60079 specifies the general requirements for construction, testing and marking of Ex 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 Ex Equipment can be operated are:

- temperature -20 °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 part of IEC 60079 and other standards supplementing this standard specify additional test requirements for Ex Equipment operating outside the standard temperature range, but further additional consideration and additional testing may be required for Ex Equipment operating outside the standard atmospheric pressure range and standard oxygen content. Such additional testing may be particularly relevant with respect to Types of Protection that depend on quenching of a flame such as 'flameproof enclosures "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 °C to $+60\text{ °C}$, the normal ambient temperature range for the Ex Equipment is -20 °C to $+40\text{ °C}$, unless otherwise specified and marked. See 5.1.1. It is considered that -20 °C to $+40\text{ °C}$ is appropriate for many items of Ex Equipment and that to manufacture all Ex 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 equipment. The ignition sources taken into account are those found associated with this type of equipment, such as hot surfaces, electromagnetic radiation, mechanically generated sparks, mechanical impacts resulting in thermite reactions, electrical arcing and static electric discharge in normal industrial environments.

NOTE 3 Where an explosive gas atmosphere and a combustible dust atmosphere are, or can be, present at the same time, the simultaneous presence of both often warrants additional protective measures. Additional guidance on the use of Ex Equipment in hybrid mixtures (mixture of a flammable gas or vapour with a combustible dust or combustible flyings) is given in IEC 60079-14.

IEC 60079 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 4 Although outside the scope of this standard, such equipment would typically be subjected to a hazard analysis that identifies and lists all of the potential sources of ignition by the equipment and the measures to be applied to prevent them becoming effective. See ISO/IEC 80079-36.

This document is supplemented or modified by the following parts and technical specifications:

- IEC 60079-1: Gas – Flameproof enclosures "d";
- IEC 60079-2: Gas and dust – Pressurized enclosure "p";
- IEC 60079-5: Gas – Powder filling "q";
- IEC 60079-6: Gas – Liquid immersion "o";
- IEC 60079-7: Gas – Increased safety "e";

- IEC 60079-11: Gas and dust – Intrinsic safety "i";
- IEC 60079-13: Gas and dust – Equipment protection by pressurized room "p" & artificially ventilated room "v";
- IEC 60079-15: Gas – Type of protection "n";
- IEC 60079-18: Gas and dust – Encapsulation "m";
- IEC 60079-25: Gas and dust – Intrinsically safe electrical systems
- IEC 60079-26: Gas – Equipment with equipment protection level (EPL) Ga
- IEC 60079-28: Gas and dust – Protection of equipment and transmission systems using optical radiation
- IEC 60079-29-1: Gas detectors – Performance requirements of detectors for flammable gases
- IEC 60079-29-4: Gas detectors – Performance requirements of open path detectors for flammable gases
- IEC/IEEE 60079-30-1: Gas and dust – Electrical resistance trace heating – General and testing requirements.
- IEC 60079-31: Dust – Protection by enclosure "t"
- IEC 60079-33: Gas and dust – Special protection "s"
- IEC 60079-35-1: Caplights for use in mines susceptible to firedamp – General requirements – Construction and testing in relation to the risk of explosion
- IEC TS 60079-39: Gas – Intrinsically safe systems with electronically controlled spark duration limitation
- IEC TS 60079-40: Gas – Requirements for process sealing between flammable process fluids and electrical systems
- ISO 80079-36: Gas and dust – Non-electrical equipment for explosive atmospheres – Basic method and requirements

This document, along with the additional parts of IEC 60079 mentioned above, is not applicable to the construction of

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*

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

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

IEC 60079-0
Edition 7.0 2017-12

ATMOSPHERES EXPLOSIVES –

Partie 0: Matériel – Exigences générales

FEUILLE D'INTERPRÉTATION 1

Cette feuille d'interprétation a été établie par le comité d'études 31 de l'IEC: Equipements pour atmosphères explosives.

Le texte de cette feuille d'interprétation est issu des documents suivants:

DISH	Rapport de vote
31/1455/DISH	31/1464/RVDISH

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette feuille d'interprétation.

Feuille d'interprétation du Paragraphe 16.6 de l'IEC 60079-0:2017

Le CAG du CE 31 a demandé (Résolution 2 du 19-04-2018) au GT22 de préparer une feuille d'interprétation fondée sur la Feuille de Décision DS2018/002 de l'IECEX, traitant de l'attribution de températures au point d'entrée et au point de branchement des machines électriques tournantes.

Détails de l'interprétation:

IEC 60079-0:2017 (Ed. 7), Atmosphères explosives – Partie 0: Matériel – Exigences générales

Interprétation du paragraphe 16.6: Température au point de branchement et au point d'entrée:

Question: Le Paragraphe 16.6 de l'IEC 60079-0:2017 (Ed 7) indique "Lorsque la température dans les conditions assignées est supérieure à 70 °C au point d'entrée, ou à 80 °C au point de branchement des conducteurs, les informations doivent être marquées à l'extérieur de

l'appareil afin de servir de recommandations pour le choix adéquat par l'utilisateur, du câble, de l'entrée de câble ou des conducteurs dans des conduits."

Il n'est pas courant que les machines électriques tournantes soient soumises à essai avec les dispositifs d'entrée de câble(s) et les câbles pouvant être utilisés dans une installation réelle, mais avec les câbles disponibles au niveau de l'emplacement d'essai du fabricant. Dans de nombreux cas, il n'y aura aucun dispositif d'entrée formel, dans la mesure où les câbles pénétreront au niveau de l'espace réservé pour la fixation d'une plaque passe-câble.

De quelle façon les températures au point d'entrée et au point de branchement correspondantes doivent-elles être déterminées?

Interprétation: *L'utilisation de la température maximale de l'air ambiant inter-espacements pour représenter la température de service maximale des garnitures et joints d'étanchéité de la boîte de connexion, la température au point de branchement du câble, et la température au point d'entrée, représente la pratique courante de réalisation des essais des machines électriques tournantes, sans connaissance préalable des entrées de câble(s) et des câbles réels à utiliser pour l'installation. La production de chaleur émise par les connexions de la machine électrique tournante est généralement insignifiante par rapport à la production de chaleur émise par les enroulements et les conducteurs de la machine.*

Renseignements complémentaires:

- 1) Il convient que le point d'entrée du câble où la température est mesurée soit étanche dans la mesure du possible afin de garantir une circulation d'air minimale, ce qui peut réduire la température mesurée.
- 2) Ceci n'est pas destiné à s'appliquer à toutes les garnitures entre la boîte de connexion et le châssis de la machine électrique tournante, où des températures plus élevées peuvent être enregistrées, mais uniquement à la garniture entre la boîte de connexion et son capot.

Bien que ce document soit rédigé dans le cadre des machines électriques tournantes, il peut exister d'autres types d'appareils pour lesquels une approche équivalente est applicable.

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ATMOSPHÈRES EXPLOSIVES –

Partie 0: Matériel – Exigences générales

FEUILLE D'INTERPRÉTATION 2

Cette feuille d'interprétation a été établie par le comité d'études 31 de l'IEC: Equipements pour atmosphères explosives.

Le texte de cette feuille d'interprétation est issu des documents suivants:

DISH	Rapport de vote
31/1469/DISH	31/1486/RVDISH

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette feuille d'interprétation.

Question:

Comment doit se présenter le marquage pour les matériels couverts à la fois par des normes électriques et des normes non électriques (séries IEC 60079 et ISO 80079) ?

Réponse:

Les matériels qui comportent à la fois une partie électrique et une partie non électrique doivent posséder un marquage combiné. Par exemple:

Ex db h IIA T4 Gb

Ex h tb IIIC T135 °C Db

Le marquage sera plus clair pour l'utilisateur si le risque combiné de la partie électrique et de la partie non électrique, couvert par un seul et même certificat, a été évalué pour le matériel complet, et indique un EPL, un groupe d'appareils et une classe de températures pour les gaz et la même chose pour les poussières (mais mentionne une température maximale de surface à la place d'une classe de températures). Il est également noté que les composants Ex ne portent pas de marquage de classe de températures (Groupe II) ni de température maximale de surface (Groupe III).

Pour les matériels ayant fait l'objet de certificats distincts, l'un pour les parties électriques et l'autre pour les parties non électriques, il convient d'utiliser des fils de marquage distincts pour les parties électriques et les parties non électriques, associé chacun à leur numéro de certificat respectif.

NOTE Des recommandations concernant le marquage des ensembles de composants sont données dans l'IEC TS 60079-46.

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