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Explosive atmospheres –
Part 1: Equipment protection by flameproof enclosures "d"

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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EXPLOSIVE ATMOSPHERES –

Part 1: Equipment protection by flameproof enclosures “d”

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 and deletions are displayed in red, with deletions being struck through.

International Standard IEC 60079-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

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

The significance of the changes between IEC 60079-1, Edition 7.0 (2014) and IEC 60079-1 Edition 6.0 (2007) (including Corrigendum 1 (2008)), is as listed below:

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Normative references (Removal of the edition date from the reference for IEC 60079-0)	2	X		
Requirements for level of protection “da” (Catalytic sensors of portable combustible gas detectors)	4.2		X	
Requirements for level of protection “dc” (“Enclosed break” devices from IEC 60079-15)	4.4, 15.5	X		
Flameproof joints, General requirements (Documentation clarification and examples of corrosion inhibiting grease)	5.1	X		
Flameproof joints, General requirements (Specific Conditions of Use that joints are not intended to be repaired)	5.1		X	
Flameproof joints, General requirements (Electroplating more than 0,008 mm thick)	5.1		X	
Non-threaded joints, Gap (i) (Intentional gaps between surface for flanged joints)	5.2.2	X		
Serrated joints (Use and test requirements)	5.2.8	X		
Multi-step joints (Not less than 3 adjacent segments and two path changes)	5.2.9		X	
Minimum width of joint and maximum gap for enclosures of groups IIA and IIB (Maximum gaps for flanged, cylindrical or spigot joints of 9,5 mm minimum width and volume greater than 2 000 cm3)	Table 2		X	
Minimum width of joint and maximum gap for enclosures of groups I, IIA, IIB and IIC (ISO 80000-1 for constructional value rounding)	Table 2, Table 3	X		
Cylindrical threaded joints (ISO 965-1 standard in respect of thread form or quality of fit)	Table 4	X		
Taper threaded joints (External and internal thread construction)	Table 5	X		
Cemented joints (Supplemental mechanical means of securement)	6.1.2			C1
Cemented joints (Evaluation criteria if there is leakage)	6.1.2		X	
Fused glass joints (Glass-to-metal joints)	6.2		X	

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Thermal tests of breathing and draining devices (Temperature class based on external surface temperature after the 10 min test period)	10.9.3.2	X		
Test of the ability of the breathing and draining device to withstand pressure (Relocated from before thermal tests to after the non-transmission test)	10.9.3.4	X		
Ex component certificate (Service temperature range for non-metallic enclosures per IEC 60079-0)	10.9.4	X		
Fasteners and openings *(Relocation of blanking element content to 13.8 and C.2.3)*	11	X		
Fasteners and openings, Property class or yield stress *(Certificate specific condition of use)*	11.3	X		
Fasteners and openings *(Openings in the wall of the enclosure)*	11.8	X		
Materials *(Material limitation in acetylene atmospheres)*	12.8			C2
Entries for flameproof enclosures, General *(Metric and NPT threaded entries)*	13.1	X		
Entries for flameproof enclosures, General *(Group I non-threaded joints)*	13.1		X	
Entries for flameproof enclosures, Non-threaded holes *(Group I application)*	13.3		X	
Entries for flameproof enclosures, Cable glands *(Group I application)*	13.4		X	
Cable glands, Conduit sealing devices *(Documentation to facilitate mounting)*	13.4,13.5	X		
Plugs and sockets and cable couplers *(Load requirement for arc-quenching test)*	13.6.4			C3
Bushings *(Documentation to facilitate mounting)*	13.7	X		
Blanking elements *(Relocated from Clause 11)*	13.8	X		
Verification and tests *(Maximum surface temperature conditions)*	Table 6	X		
Type tests *(Sequence and number of samples for tests)*	15	X		
Determination of explosion pressure, General *(Devices that can cause turbulence)*	15.2.2.2	X		
Determination of explosion pressure, General *(Number of tests for Group IIC)*	15.2.2.2	X		
Determination of explosion pressure, General *(Pressure pilling for Group IIB)*	15.2.2.4	X		

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Determination of explosion pressure, General *(Equipment marked for a single gas)*	15.2.2.5	X		
Overpressure test, General *(Low ambient overpressure tests not required)*	15.2.3	X		
Overpressure test – First method (static) *(3 times option when routine batch testing)*	15.2.3.2		X	
Overpressure test – First method (static) *(Adjustment for low ambient due to small size of equipment)*	15.2.3.2		X	
Overpressure test – Second method (dynamic) *(Number of tests to be made)*	15.2.3.3	X		
Test for non-transmission of an internal ignition *(Clarification regarding grease)*	15.3	X		
Reduction in length of a threaded joint for non-transmission test *(ISO 965-1 and 965-3 standards in respect of thread form and quality of fit)*	Table 9	X		
Test factors to increase pressure or test gap *(Group IIC adjustments for elevated ambients)*	Table 10	X		
Test for non-transmission of an internal ignition, Groups I, IIA and IIB *(Number of tests to be made)*	15.3.2.3	X		
Test for non-transmission of an internal ignition, Group IIC testing by increased gap *(Number of tests to be made)*	15.3.3.2	X		
Test for non-transmission of an internal ignition, Group IIC *(Oxygen enrichment of test gases)*	15.3.3.4		X	
Thermal tests of enclosures with breathing and draining devices *(Temperature class based on external surface temperature after the 10 min test period)*	15.4.3.1	X		
Tests for “dc” devices (“Enclosed break” devices from IEC 60079-15)	15.5		X	
Routine tests, General *(Adjustment for low ambient due to small size of equipment)*	16.1.2		X	
Routine tests, General *(Options when second method is chosen)*	16.1.3	X		
Routine tests, General *(Welded joint inspection options)*	16.3		X	
Routine tests, General *(Allowance for batch testing)*	16.6		X	
Switchgear for Group I *(Clarifying need for compliance with EPL Mb types of protection)*	17.2.2, 17.2.3	X		
Non-metallic enclosures and non-metallic parts of enclosures, General *(Exception for cemented joints)*	19.1	X		

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Non-metallic enclosures and non-metallic parts of enclosures, Resistance to tracking and creepage distances *(Reference to both IEC 60079-7 and or IEC 60079-15)*	19.2		X	
Non-metallic enclosures and non-metallic parts of enclosures, Requirements for type tests *(Clarification of test sequence)*	19.3	X		
Instructions *(Indication that repair of flamepaths is not intended)*	21		X	
Bushings *(Documentation regarding numbers of cores)*	C.2.1.4	X		
Bushings *(Criteria for non-transmission test)*	C.2.1.4	X		
Bushings *(Evaluation criteria if there is leakage)*	C.2.1.4		X	
Flameproof joints, Threaded joints *(Requirement options)*	C.2.2.1	X		
Flameproof joints, Non-threaded joints *(Group I application)*	C.2.2.2		X	
Constructional requirements for Ex blanking elements *(Relocated from Clause 11)*	C.2.3.1	X		
Constructional requirements for Ex blanking elements *(Metric and NPT Ex blanking elements)*	C.2.3.2, C.2.3.3	X		
Constructional requirements for Ex blanking elements *(Group I non-threaded construction)*	C.2.3.4		X	
Sealing test, General *(Allowance for re-tightening)*	C.3.1.1	X		
Cable glands and conduit sealing devices with sealing ring *(Mandrel to be corrosion-resistant metal)*	C.3.1.2	X		
Type tests for Ex blanking elements, Torque test *(Test-block to be steel)*	C.3.3.1	X		
Tightening torque values *(Addition of < 16 mm thread size)*	Table C.1		X	
Tightening torque values *(Addition of NPT thread sizes)*	Table C.2		X	
Ex component enclosure requirements *(Markings content)*	D.3.8			C4
Ex component enclosure requirements *(Certificate content)*	D.3.10		X	
Utilization of an Ex component enclosure certificate to prepare an equipment certificate, Procedure *(Devices that can create significant turbulence)*	D.4.1		X	
Acceptable primary cells *(Addition of Type B cells)*	Table E.1		X	

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Acceptable primary cells *(Removal of Type T cells)*	Table E.1			C5
Acceptable secondary cells *(Addition of Lithium type cells)*	Table E.2		X	
Prevention of excessive temperature and cell damage *(Application of IEC 60079-11 requirement)*	E.4.1.2	X		
Prevention of inadvertent charging of a battery by other voltage sources in the enclosure *(Construction not requiring additional protection)*	E.4.3		X	
Recharging of secondary cells inside flameproof enclosures *(Additional battery options)*	E.5.1		X	
Introduction of an alternative risk assessment method encompassing equipment protection levels' for Ex equipment *(Removal of previous Informative Annex)*	Annex G	X		
Additional requirements for Flameproof enclosures with an internal source of release (containment system) *(Addition of new Normative Annex)*	Annex G		X	
Requirements for machines with flameproof "d" enclosures fed from converters *(Addition of new Normative Annex)*	Annex H		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 can 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

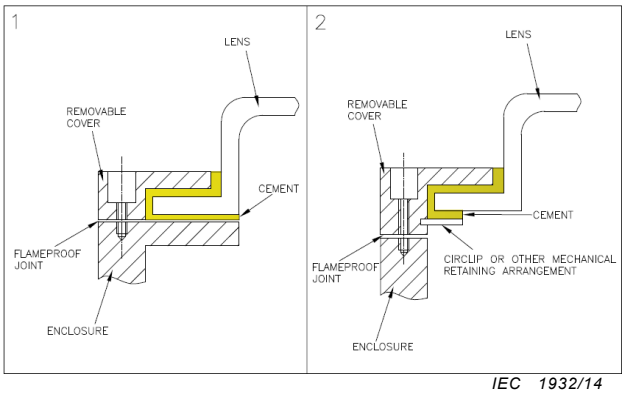
These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be

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 'Major Technical Changes'

C1 – Supplemental mechanical means of securing the cemented joint shall not be defeated by the opening of doors or covers that are intended to be opened during installation or maintenance. For example, in the images below for a luminaire incorporating a cemented joint between the lens and the enclosure cover, the construction shown in the second image would be in accordance with this requirement, while the construction shown in the first image would not.



IEC 1932/14

C2 – Addition of material limitations of enclosures of equipment and enclosures of Ex components for external mounting, if constructed of copper or copper alloys, when used in explosive gas atmospheres containing acetylene (12.8).

C3 – Addition of power factor requirement for evaluating the ability of a plug and socket to remain flameproof during the arc-quenching period while opening a test circuit (13.6.4).

C4 – Addition of marking requirements for Ex component enclosures, in addition to the requirements for marking of Ex components given in IEC 60079-0 (D.3.8).

C5 – Removal of Type T cells as acceptable primary cells (Table E.1).

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

FDIS	Report on voting
31/1111/FDIS	31/1125/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 in the IEC 60079 series, published under the general title *Explosive atmospheres*, can be found on the IEC website.

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.

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EXPLOSIVE ATMOSPHERES –

Part 1: Equipment protection by flameproof enclosures “d”

1 Scope

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

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

~~NOTE Equipment protection by flameproof enclosures “d” provides Equipment Protection Level (EPL) Gb. For further information, see Annex G.~~

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

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

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

~~IEC 60079-14:2002, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*~~

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

~~IEC 60086-1:2000, *Primary batteries – Part 1: General*~~

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

~~IEC 60623:2001, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells*~~

~~IEC 60662:1980, *High-pressure sodium vapour lamps*~~

~~IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*~~

~~IEC 61951-1:2003, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 1: Nickel-cadmium*~~

~~IEC 61951-2:2003, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2:Nickel-metal hydride*~~

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

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

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

ISO 2738~~:1999~~, *Sintered metal materials, excluding hardmetals – Permeable sintered metal materials – Determination of density, oil content and open porosity*

~~ISO 3864: 1984, *Safety colours and safety signs*~~

ISO 4003~~:1977~~, *Permeable sintered metal materials – Determination of bubble test pore size*

ISO 4022~~:1987~~, *Permeable sintered metal materials – Determination of fluid permeability*

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

IEC 60079-1

Edition 7.0 2014-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Explosive atmospheres –
Part 1: Equipment protection by flameproof enclosures “d”

Atmosphères explosives –
Partie 1: Protection du matériel par enveloppes antidéflagrantes «d»



IEC 60079-1:2014-06(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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EXPLOSIVE ATMOSPHERES –

Part 1: Equipment protection by flameproof enclosures “d”

FOREWORD

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International Standard IEC 60079-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

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

The significance of the changes between IEC 60079-1, Edition 7.0 (2014) and IEC 60079-1 Edition 6.0 (2007) (including Corrigendum 1 (2008)), is as listed below:

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Normative references (Removal of the edition date from the reference for IEC 60079-0)	2	X		
Requirements for level of protection “da” (Catalytic sensors of portable combustible gas detectors)	4.2		X	
Requirements for level of protection “dc” (“Enclosed break” devices from IEC 60079-15)	4.4, 15.5	X		
Flameproof joints, General requirements (Documentation clarification and examples of corrosion inhibiting grease)	5.1	X		
Flameproof joints, General requirements (Specific Conditions of Use that joints are not intended to be repaired)	5.1		X	
Flameproof joints, General requirements (Electroplating more than 0,008 mm thick)	5.1		X	
Non-threaded joints, Gap (i) (Intentional gaps between surface for flanged joints)	5.2.2	X		
Serrated joints (Use and test requirements)	5.2.8	X		
Multi-step joints (Not less than 3 adjacent segments and two path changes)	5.2.9		X	
Minimum width of joint and maximum gap for enclosures of groups IIA and IIB (Maximum gaps for flanged, cylindrical or spigot joints of 9,5 mm minimum width and volume greater than 2 000 cm3)	Table 2		X	
Minimum width of joint and maximum gap for enclosures of groups I, IIA, IIB and IIC (ISO 80000-1 for constructional value rounding)	Table 2, Table 3	X		
Cylindrical threaded joints (ISO 965-1 standard in respect of thread form or quality of fit)	Table 4	X		
Taper threaded joints (External and internal thread construction)	Table 5	X		
Cemented joints (Supplemental mechanical means of securement)	6.1.2			C1
Cemented joints (Evaluation criteria if there is leakage)	6.1.2		X	
Fused glass joints (Glass-to-metal joints)	6.2		X	
Thermal tests of breathing and draining devices (Temperature class based on external surface temperature after the 10 min test period)	10.9.3.2	X		
Test of the ability of the breathing and draining device to withstand pressure (Relocated from before thermal tests to after the non-transmission test)	10.9.3.4	X		

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Ex component certificate (Service temperature range for non-metallic enclosures per IEC 60079-0)	10.9.4	X		
Fasteners and openings *(Relocation of blanking element content to 13.8 and C.2.3)*	11	X		
Fasteners and openings, Property class or yield stress *(Certificate specific condition of use)*	11.3	X		
Fasteners and openings *(Openings in the wall of the enclosure)*	11.8	X		
Materials *(Material limitation in acetylene atmospheres)*	12.8			C2
Entries for flameproof enclosures, General *(Metric and NPT threaded entries)*	13.1	X		
Entries for flameproof enclosures, General *(Group I non-threaded joints)*	13.1		X	
Entries for flameproof enclosures, Non-threaded holes *(Group I application)*	13.3		X	
Entries for flameproof enclosures, Cable glands *(Group I application)*	13.4		X	
Cable glands, Conduit sealing devices *(Documentation to facilitate mounting)*	13.4,13.5	X		
Plugs and sockets and cable couplers *(Load requirement for arc-quenching test)*	13.6.4			C3
Bushings *(Documentation to facilitate mounting)*	13.7	X		
Blanking elements *(Relocated from Clause 11)*	13.8	X		
Verification and tests *(Maximum surface temperature conditions)*	Table 6	X		
Type tests *(Sequence and number of samples for tests)*	15	X		
Determination of explosion pressure, General *(Devices that can cause turbulence)*	15.2.2.2	X		
Determination of explosion pressure, General *(Number of tests for Group IIC)*	15.2.2.2	X		
Determination of explosion pressure, General *(Pressure pilling for Group IIB)*	15.2.2.4	X		
Determination of explosion pressure, General *(Equipment marked for a single gas)*	15.2.2.5	X		
Overpressure test, General *(Low ambient overpressure tests not required)*	15.2.3	X		
Overpressure test – First method (static) *(3 times option when routine batch testing)*	15.2.3.2		X	

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Overpressure test – First method (static) *(Adjustment for low ambient due to small size of equipment)*	15.2.3.2		X	
Overpressure test – Second method (dynamic) *(Number of tests to be made)*	15.2.3.3	X		
Test for non-transmission of an internal ignition *(Clarification regarding grease)*	15.3	X		
Reduction in length of a threaded joint for non-transmission test *(ISO 965-1 and 965-3 standards in respect of thread form and quality of fit)*	Table 9	X		
Test factors to increase pressure or test gap *(Group IIC adjustments for elevated ambients)*	Table 10	X		
Test for non-transmission of an internal ignition, Groups I, IIA and IIB *(Number of tests to be made)*	15.3.2.3	X		
Test for non-transmission of an internal ignition, Group IIC testing by increased gap *(Number of tests to be made)*	15.3.3.2	X		
Test for non-transmission of an internal ignition, Group IIC *(Oxygen enrichment of test gases)*	15.3.3.4		X	
Thermal tests of enclosures with breathing and draining devices *(Temperature class based on external surface temperature after the 10 min test period)*	15.4.3.1	X		
Tests for “dc” devices (“Enclosed break” devices from IEC 60079-15)	15.5		X	
Routine tests, General *(Adjustment for low ambient due to small size of equipment)*	16.1.2		X	
Routine tests, General *(Options when second method is chosen)*	16.1.3	X		
Routine tests, General *(Welded joint inspection options)*	16.3		X	
Routine tests, General *(Allowance for batch testing)*	16.6		X	
Switchgear for Group I *(Clarifying need for compliance with EPL Mb types of protection)*	17.2.2, 17.2.3	X		
Non-metallic enclosures and non-metallic parts of enclosures, General *(Exception for cemented joints)*	19.1	X		
Non-metallic enclosures and non-metallic parts of enclosures, Resistance to tracking and creepage distances *(Reference to both IEC 60079-7 and or IEC 60079-15)*	19.2		X	
Non-metallic enclosures and non-metallic parts of enclosures, Requirements for type tests *(Clarification of test sequence)*	19.3	X		

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Instructions *(Indication that repair of flamepaths is not intended)*	21		X	
Bushings *(Documentation regarding numbers of cores)*	C.2.1.4	X		
Bushings *(Criteria for non-transmission test)*	C.2.1.4	X		
Bushings *(Evaluation criteria if there is leakage)*	C.2.1.4		X	
Flameproof joints, Threaded joints *(Requirement options)*	C.2.2.1	X		
Flameproof joints, Non-threaded joints *(Group I application)*	C.2.2.2		X	
Constructional requirements for Ex blanking elements *(Relocated from Clause 11)*	C.2.3.1	X		
Constructional requirements for Ex blanking elements *(Metric and NPT Ex blanking elements)*	C.2.3.2, C.2.3.3	X		
Constructional requirements for Ex blanking elements *(Group I non-threaded construction)*	C.2.3.4		X	
Sealing test, General *(Allowance for re-tightening)*	C.3.1.1	X		
Cable glands and conduit sealing devices with sealing ring *(Mandrel to be corrosion-resistant metal)*	C.3.1.2	X		
Type tests for Ex blanking elements, Torque test *(Test-block to be steel)*	C.3.3.1	X		
Tightening torque values *(Addition of < 16 mm thread size)*	Table C.1		X	
Tightening torque values *(Addition of NPT thread sizes)*	Table C.2		X	
Ex component enclosure requirements *(Markings content)*	D.3.8			C4
Ex component enclosure requirements *(Certificate content)*	D.3.10		X	
Utilization of an Ex component enclosure certificate to prepare an equipment certificate, Procedure *(Devices that can create significant turbulence)*	D.4.1		X	
Acceptable primary cells *(Addition of Type B cells)*	Table E.1		X	
Acceptable primary cells *(Removal of Type T cells)*	Table E.1			C5
Acceptable secondary cells *(Addition of Lithium type cells)*	Table E.2		X	
Prevention of excessive temperature and cell damage *(Application of IEC 60079-11 requirement)*	E.4.1.2	X		

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Prevention of inadvertent charging of a battery by other voltage sources in the enclosure *(Construction not requiring additional protection)*	E.4.3		X	
Recharging of secondary cells inside flameproof enclosures *(Additional battery options)*	E.5.1		X	
Introduction of an alternative risk assessment method encompassing equipment protection levels' for Ex equipment *(Removal of previous Informative Annex)*	Annex G	X		
Additional requirements for Flameproof enclosures with an internal source of release (containment system) *(Addition of new Normative Annex)*	Annex G		X	
Requirements for machines with flameproof "d" enclosures fed from converters *(Addition of new Normative Annex)*	Annex H		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 can 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

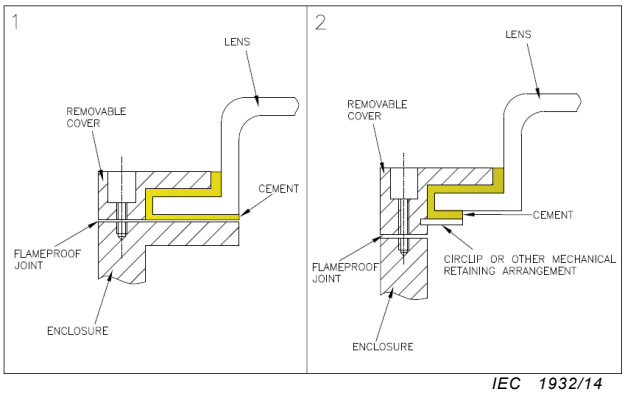
These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity 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 'Major Technical Changes'

C1 – Supplemental mechanical means of securing the cemented joint shall not be defeated by the opening of doors or covers that are intended to be opened during

installation or maintenance. For example, in the images below for a luminaire incorporating a cemented joint between the lens and the enclosure cover, the construction shown in the second image would be in accordance with this requirement, while the construction shown in the first image would not.



IEC 1932/14

C2 – Addition of material limitations of enclosures of equipment and enclosures of Ex components for external mounting, if constructed of copper or copper alloys, when used in explosive gas atmospheres containing acetylene (12.8).

C3 – Addition of power factor requirement for evaluating the ability of a plug and socket to remain flameproof during the arc-quenching period while opening a test circuit (13.6.4).

C4 – Addition of marking requirements for Ex component enclosures, in addition to the requirements for marking of Ex components given in IEC 60079-0 (D.3.8).

C5 – Removal of Type T cells as acceptable primary cells (Table E.1).

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

FDIS	Report on voting
31/1111/FDIS	31/1125/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 in the IEC 60079 series, published under the general title *Explosive atmospheres*, can be found on the IEC website.

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.

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 document using a colour printer.

EXPLOSIVE ATMOSPHERES –

Part 1: Equipment protection by flameproof enclosures “d”

1 Scope

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

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

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 60127 (all parts), *Miniature fuses*

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 2738, *Sintered metal materials, excluding hardmetals – Permeable sintered metal materials – Determination of density, oil content and open porosity*

ISO 4003, *Permeable sintered metal materials – Determination of bubble test pore size*

ISO 4022, *Permeable sintered metal materials – Determination of fluid permeability*

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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ATMOSPHÈRES EXPLOSIVES –

Partie 1: Protection du matériel par enveloppes antidéflagrantes «d»

AVANT-PROPOS

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La Norme internationale IEC 60079-1 a été établie par le comité d'études 31 de l'IEC: Équipements pour atmosphères explosives.

Cette septième édition annule et remplace la sixième édition parue en 2007. Cette édition constitue une révision technique.

L'importance des modifications entre l'IEC 60079-1, Édition 7.0 (2014) et l'IEC 60079-1 Édition 6.0 (2007) (y compris le Corrigendum 1 (2008)), est indiquée ci-dessous:

		Type		
Explication de l'importance des modifications	**Article**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Références normatives (Suppression de la date d'édition de la référence de l'IEC 60079-0)	2	X		
Exigences applicables au niveau de protection «da» (Capteurs catalytiques pour les détecteurs portables de gaz inflammables)	4.2		X	
Exigences applicables au niveau de protection «dc» (Dispositifs «à coupure enfermée» de l'IEC 60079-15)	4.4, 15.5	X		
Joints antidéflagrants, Exigences générales (Clarification de la documentation et exemples de graisse empêchant la corrosion)	5.1	X		
Joints antidéflagrants, Exigences générales (Conditions spécifiques d'utilisation selon lesquelles les joints ne sont pas destinés à être réparés)	5.1		X	
Joints antidéflagrants, Exigences générales (Dépôt électrolytique sur plus de 0,008 mm d'épaisseur)	5.1		X	
Joints non filetés, Interstice (*i*) (Interstices intentionnels entre les surfaces des joints à bride)	5.2.2	X		
Joints dentelés (Exigences d'utilisation et d'essai)	5.2.8	X		
Joints à pas multiples (Pas moins de 3 segments adjacents et de deux changements de direction du chemin)	5.2.9		X	
Longueur minimale de joint et interstice maximal des enveloppes des groupes IIA et IIB (Interstices maximaux pour les joints à bride, cylindriques ou à emboîtement d'une longueur minimale de 9,5 mm et d'un volume supérieur à 2 000 cm^3)	Tableau 2		X	
Longueur minimale de joint et interstice maximal des enveloppes des groupes I, IIA, IIB et IIC (ISO 80000-1 pour l'arrondi des valeurs de construction)	Tableau 2, Tableau 3	X		
Joints filetés cylindriques (Norme ISO 965-1 relative au profil de filet ou à la qualité d'ajustement)	Tableau 4	X		
Joints filetés coniques (Construction des filets externes et internes)	Tableau 5	X		
Joints scellés (Dispositifs mécaniques supplémentaires de fixation)	6.1.2			C1
Joints scellés (Critères d'évaluation en cas de fuite)	6.1.2		X	
Joints par fusion de verre (Joints de scellement verre/métal)	6.2		X	

		Type		
Explication de l'importance des modifications	**Article**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Essais thermiques des dispositifs de respiration et de drainage (Classe de température basée sur la température de la surface externe après la période d'essai de 10 min)	10.9.3.2	X		
Essai de tenue à la pression des dispositifs de respiration et de drainage (Déplacé de la période avant les essais thermiques pour être placé dans la période après l'essai de non-transmission)	10.9.3.4	X		
Certificat de composant Ex (Gamme de températures de service pour les enveloppes non métalliques selon l'IEC 60079-0)	10.9.4	X		
Fermetures et ouvertures *(Affectation du contenu des éléments d'obturation à 13.8 et C.2.3)*	11	X		
Fermetures et ouvertures, Classe de propriété ou résistance à la traction *(Condition spécifique d'utilisation du Certificat)*	11.3	X		
Fermetures et ouvertures *(Ouvertures dans la paroi de l'enveloppe)*	11.8	X		
Matériaux *(Limitation d'utilisation de matériaux dans des atmosphères contenant de l'acétylène)*	12.8			C2
Entrées des enveloppes antidéflagrantes, Généralités *(Entrées filetées métriques et NPT)*	13.1	X		
Entrées des enveloppes antidéflagrantes, Généralités *(Joints non filetés du Groupe I)*	13.1		X	
Entrées des enveloppes antidéflagrantes, Orifices non taraudés *(Application au Groupe I)*	13.3		X	
Entrées des enveloppes antidéflagrantes, Entrées de câbles *(Application au Groupe I)*	13.4		X	
Entrées de câbles, dispositifs d'étanchéité de conduit *(Documentation pour faciliter le montage)*	13.4,13.5	X		
Prises de courant et prolongateurs *(Exigence de charge pour l'essai d'extinction de l'arc)*	13.6.4			C3
Traversées *(Documentation pour faciliter le montage)*	13.7	X		
Éléments d'obturation *(Déplacés de l'Article 11)*	13.8	X		
Vérification et essais *(Conditions pour la détermination de la température maximale de surface)*	Tableau 6	X		

		Type		
Explication de l'importance des modifications	**Article**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Essais de type *(Séquence et nombre d'échantillons pour les essais)*	15	X		
Détermination de la pression d'explosion, Généralités *(Dispositifs qui peuvent créer de la turbulence)*	15.2.2.2	X		
Détermination de la pression d'explosion, Généralités *(Nombre d'essais pour le Groupe IIC)*	15.2.2.2	X		
Détermination de la pression d'explosion, Généralités *(Accumulation de pression pour le Groupe IIB)*	15.2.2.4	X		
Détermination de la pression d'explosion, Généralités *(Matériel destiné à être utilisé dans un seul gaz)*	15.2.2.5	X		
Essai de surpression, Généralités *(Essais de surpression à basse température ambiante non exigés)*	15.2.3	X		
Essai de surpression – Première méthode (statique) *(3 fois – option – en cas d'essais individuels de série par lots)*	15.2.3.2		X	
Essai de surpression – Première méthode (statique) *(Ajustement par rapport à la basse température ambiante en raison de la petite taille du matériel)*	15.2.3.2		X	
Essai de surpression – Deuxième méthode (dynamique) *(Nombre d'essais à effectuer)*	15.2.3.3	X		
Essai de non-transmission d'une inflammation interne *(Clarification portant sur la graisse)*	15.3	X		
Réduction de la longueur d'un joint fileté pour l'essai de non-transmission *(Les normes ISO 965-1 et 965-3 relatives au profil de filet et à la qualité d'ajustement)*	Tableau 9	X		
Facteurs d'essai pour augmenter la pression ou l'interstice d'essai *(Ajustements pour le Groupe IIC pour les températures ambiantes élevées)*	Tableau 10	X		
Essai de non-transmission d'une inflammation interne, Groupes I, IIA et IIB *(Nombre d'essais à effectuer)*	15.3.2.3	X		
Essai de non-transmission d'une inflammation interne, Groupe IIC, essai en augmentant l'interstice *(Nombre d'essais à effectuer)*	15.3.3.2	X		
Essai de non-transmission d'une inflammation interne, Groupe IIC *(Enrichissement de l'oxygène des gaz d'essai)*	15.3.3.4		X	
Essais thermiques des enveloppes avec dispositifs de respiration et de drainage *(Classe de température basée sur la température de la surface externe après la période d'essai de 10 min)*	15.4.3.1	X		
Essais des dispositifs "dc" (dispositifs de «à coupure enfermée» de l'IEC 60079-15)	15.5		X	

		Type		
Explication de l'importance des modifications	**Article**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Essais individuels de série, Généralités *(Ajustement par rapport à la basse température ambiante en raison de la petite taille du matériel)*	16.1.2		X	
Essais individuels de série, Généralités *(Options lorsque la deuxième méthode est choisie)*	16.1.3	X		
Essais individuels de série, Généralités *(Options de contrôle des joints soudés)*	16.3		X	
Essais individuels de série, Généralités *(Tolérance des essais par lots)*	16.6		X	
Appareillage pour le Groupe I *(Nécessité de clarification de la conformité aux modes de protection EPL Mb)*	17.2.2, 17.2.3	X		
Enveloppes non métalliques et parties non métalliques d'enveloppes, Généralités *(sauf les joints scellés)*	19.1	X		
Enveloppes non métalliques et parties non métalliques d'enveloppes, Résistance au courant de cheminement et lignes de fuite *(Référence à l'IEC 60079-7 et/ou à l'IEC 60079-15)*	19.2		X	
Enveloppes non métalliques et parties non métalliques d'enveloppes, Exigences pour les essais de type *(Clarification de la séquence d'essais)*	19.3	X		
Instructions *(Indication selon laquelle la réparation des passages de flamme n'est pas prévue)*	21		X	
Traversées *(Documentation relative au nombre de conducteurs)*	C.2.1.4	X		
Traversées *(Critères de l'essai de non-transmission)*	C.2.1.4	X		
Traversées *(Critères d'évaluation en cas de fuite)*	C.2.1.4		X	
Joints antidéflagrants, Joints taraudés, *(Options d'exigences)*	C.2.2.1	X		
Joints antidéflagrants, Joints non taraudés, *(Application au Groupe I)*	C.2.2.2		X	
Exigences de construction pour éléments d'obturation Ex *(Déplacées de l'Article 11)*	C.2.3.1	X		
Exigences de construction pour éléments d'obturation Ex *(Éléments d'obturation Ex métriques et NPT)*	C.2.3.2, C.2.3.3	X		
Exigences de construction pour éléments d'obturation Ex *(Construction non filetée pour le Groupe I)*	C.2.3.4		X	
Essai d'étanchéité, Généralités *(Tolérance pour le resserrage)*	C.3.1.1	X		

		Type		
Explication de l'importance des modifications	**Article**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Entrées de câble et dispositifs d'étanchéité de conduit avec bagues d'étanchéité *(Mandrin en métal résistant à la corrosion)*	C.3.1.2	X		
Essais de type pour éléments d'obturation Ex, Essais de torsion *(Bloc d'essai en acier)*	C.3.3.1	X		
Valeurs de couple de serrage *(Ajout de dimension du filetage < 16 mm)*	Tableau C.1		X	
Valeurs de couple de serrage *(Ajout des dimensions de filetage NPT)*	Tableau C.2		X	
Exigences des enveloppes de composants Ex *(Contenu des marquages)*	D.3.8			C4
Exigences des enveloppes de composants Ex *(Contenu du certificat)*	D.3.10		X	
Utilisation du certificat d'enveloppe de composants Ex pour préparer un certificat de matériel, Procédure *(Dispositifs qui peuvent créer une turbulence importante)*	D.4.1		X	
Piles admissibles *(Ajout des piles de Type B)*	Tableau E.1		X	
Piles admissibles *(Suppression des piles de Type T)*	Tableau E.1			C5
Accumulateurs acceptables *(Ajout des piles au lithium)*	Tableau E.2		X	
Prévention d'une température excessive et d'un endommagement d'un élément *(Application des exigences de l'IEC 60079-11)*	E.4.1.2	X		
Prévention de charge par inadvertance d'une batterie par d'autres sources de tension présentes dans l'enveloppe *(Construction ne nécessitant aucune protection supplémentaire)*	E.4.3		X	
Recharge des accumulateurs à l'intérieur des enveloppes antidéflagrantes *(Options de batterie supplémentaire)*	E.5.1		X	
Introduction d'une autre méthode d'évaluation des risques englobant des niveaux de protection du matériel (EPL) pour le matériel Ex *(Suppression de l'ancienne Annexe Informative)*	Annexe G	X		
Exigences complémentaires applicables aux enveloppes antidéflagrantes avec une source interne de dégagement (système de confinement) *(Ajout d'une nouvelle Annexe Normative)*	Annexe G		X	
Exigences relatives aux machines avec enveloppes antidéflagrantes "d" alimentées par des convertisseurs *(Ajout d'une nouvelle Annexe Normative)*	Annexe H		X	

NOTE Les modifications techniques dont il est fait mention indiquent l'importance des modifications techniques contenues dans la version révisée de la norme IEC, mais elles ne constituent pas une liste exhaustive de toutes les modifications par rapport à la version précédente. D'autres lignes directrices sont données dans la Version de base de la norme.

Explications:

A) Définitions

Modifications mineures et rédactionnelles

Clarification
réduction des exigences techniques
modifications techniques mineures
corrections d'ordre rédactionnel

Ces modifications portent sur les exigences et sont de nature rédactionnelle ou technique mineure. Elles comprennent des modifications de formulation destinées à clarifier les exigences techniques sans apporter de modification technique ni réduire le niveau actuel de l'exigence.

Extension

ajout d'options techniques

Ces modifications ajoutent de nouvelles exigences techniques ou modifient les exigences techniques existantes, de façon à fournir de nouvelles options, mais sans augmenter les niveaux d'exigences pour tout matériel qui était totalement conforme à la précédente Norme. Ces modifications ne sont donc pas à prendre en compte dans le cas de produits conformes à la précédente édition.

Modifications techniques majeures

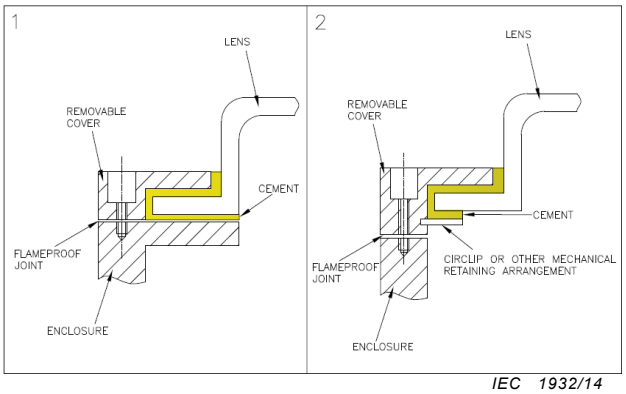
ajout d'exigences techniques
augmentation des exigences techniques

Ces modifications sont apportées aux exigences techniques (ajout, augmentation du niveau ou suppression) de telle façon qu'un produit conforme à la précédente édition n'a pas toujours la capacité de satisfaire aux exigences indiquées dans la dernière édition. Ces modifications sont à prendre en compte dans le cas de produits conformes à la précédente édition. L'Article B) ci-dessous fournit des informations supplémentaires sur ces modifications.

NOTE Ces modifications reflètent les connaissances technologiques actuelles. Cependant, il convient que ces modifications n'aient généralement pas d'influence sur le matériel déjà sur le marché.

B) Informations sur l'origine des "Modifications techniques majeures"

C1 – Les dispositifs mécaniques supplémentaires permettant de fixer le joint scellé ne doivent pas être rendus inopérants du fait de l'ouverture de portes ou de couvercles destinés à être ouverts pendant l'installation ou la maintenance. Par exemple, dans les images ci-dessous montrant un luminaire comportant un joint scellé entre la lentille et le couvercle de l'enveloppe, la construction montrée dans la deuxième image est conforme à cette exigence, alors que la construction montrée dans la première image ne l'est pas.



IEC 1932/14

Légende

Anglais	Français
Lens	Lentille
Removable cover	Couvercle démontable
Cement	Scellement
Flameproof joint	Joint antidéflagrant
Enclosure	Enveloppe
Circlip or other mechanical retaining arrangement	Circlip ou autre dispositif de fixation mécanique

C2 – Ajout de limitations de matériaux des enveloppes du matériel et des enveloppes de composants Ex pour montage externe, si elles sont en cuivre ou alliages de cuivre, lorsqu'utilisées dans les atmosphères explosives gazeuses contenant de l'acétylène (12.8).

C3 – Ajout d'exigences de facteur de puissance pour l'évaluation de la tenue d'une prise de courant à demeurer antidéflagrante pendant la période d'extinction d'arc à l'ouverture d'un circuit d'essai (13.6.4).

C4 – Ajout d'exigences de marquage relatives aux enveloppes de composants Ex, en plus des exigences de marquage des composants Ex spécifiées dans l'IEC 60079-0 (D.3.8).

C5 – Suppression des piles de type T en tant que piles admissibles (Tableau E.1).

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
31/1111/FDIS	31/1125/RVD

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

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60079, publiées sous le titre général *Atmosphères explosives*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.

ATMOSPHÈRES EXPLOSIVES –

Partie 1: Protection du matériel par enveloppes antidéflagrantes «d»

1 Domaine d'application

La présente partie de l'IEC 60079 contient les exigences spécifiques de construction et d'essai du matériel électrique à enveloppe antidéflagrante, mode de protection «d», destiné à être utilisé dans les atmosphères explosives gazeuses.

La présente Norme complète et modifie les exigences générales de l'IEC 60079-0. Lorsqu'une exigence de cette norme entre en conflit avec une exigence de l'IEC 60079-0, l'exigence de la présente norme prévaudra.

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60061 (toutes les parties), *Culots de lampes et douilles ainsi que calibres pour le contrôle de l'interchangeabilité et de la sécurité*

IEC 60079-0, *Atmosphères explosives – Partie 0: Matériel – Exigences générales*

IEC 60079-7, *Atmosphères explosives – Partie 7: Protection de l'équipement par sécurité augmentée «e»*

IEC 60079-11, *Atmosphères explosives – Partie 11: Protection de l'équipement par sécurité intrinsèque «i»*

IEC 60079-15, *Atmosphères explosives – Partie 15: Protection du matériel par mode de protection «n»*

IEC 60127 (toutes les parties), *Coupe-circuit miniatures*

ISO 965-1, *Filetages métriques ISO pour usages généraux – Tolérances – Partie 1: Principes et données fondamentales*

ISO 965-3, *Filetages métriques ISO pour usages généraux – Tolérances – Partie 3: Écarts pour filetages de construction*

ISO 2738, *Matériaux métalliques frittés, à l'exclusion des métaux durs – Matériaux métalliques frittés perméables – Détermination de la masse volumique, de la teneur en huile et de la porosité ouverte*

ISO 4003, *Matériaux en métal fritté perméable – Détermination de la dimension des pores – Méthode bulloscopique*

ISO 4022, *Matériaux métalliques frittés perméables – Détermination de la perméabilité aux fluides*

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