UL 60079-1

STANDARD FOR SAFETY

Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”

UL Standard for Safety for Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”, UL 60079-1

Seventh Edition, Dated September 18, 2015

Summary of Topics

This revision of ANSI/UL 60079-1 dated January 23, 2020 includes a US National Difference for Level of Protection "db" plugs and sockets limited to EPL Gc; 13.6.5DV

This standard is an adoption of IEC 60079-1, Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d” (seventh edition, issued June 2014) with US National Differences.

The new revised requirements are substantially in accordance with Proposal (s) on this subject dated September 13, 2019.

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ANSI/UL 60079-1-2020

UL 60079-1

Standard for Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures "d"

Seventh Edition

September 18, 2015

This ANSI/UL Standard for Safety consists of the Seventh Edition including revisions through January 23, 2020.

The most recent designation of ANSI/UL 60079-1 as an American National Standard (ANSI) occurred on January 23, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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PREFACE (UL)

This UL standard is based on IEC Publication 60079-1: 2014 edition, Explosive Atmospheres - Part 1: Equipment Protection by Flameproof Enclosures "d" issued 06-2014. IEC publication IEC 60079-1 is copyrighted by the IEC.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

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National Differences

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60079-1, Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”, (seventh edition, issued by IEC June 2014), are indicated by notations (differences) and are presented in bold text using legislative text (strike-out and underline).

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

The UL standard includes the national difference types within the body of the text.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

DR – These are National Differences based on the **national regulatory requirements**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES – Part 1: Equipment protection by flameproof enclosures “d”

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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6) All users should ensure that they have the latest edition of this publication.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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 cm^3)	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			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)*	15.2.2.5DV.1	X		
Overpressure test, General *(Low ambient overpressure tests not required)*	15.2.3	X		
Overpressure test – First method (static)	15.2.3.2		X	

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
(3 times option when routine batch testing)				
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		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	E.4.1	X		

		Type		
Explanation of the significance of the changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
(Application of IEC 60079-11 requirement)				
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

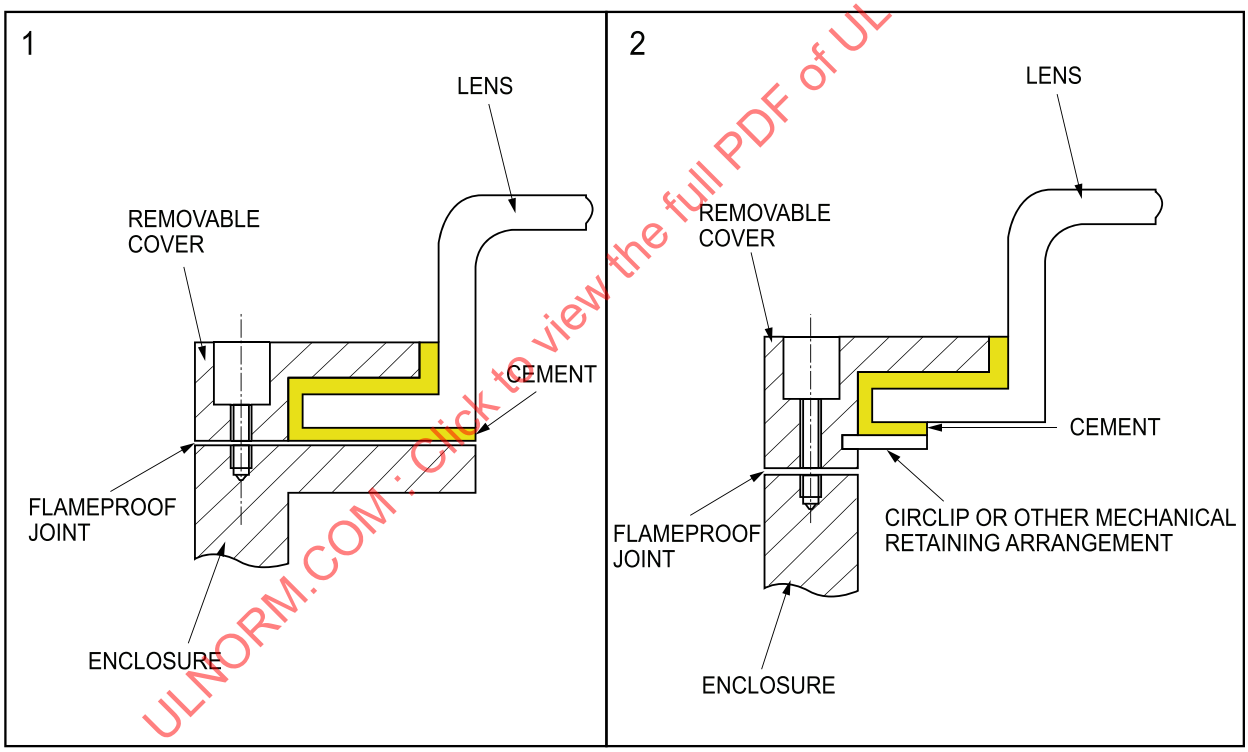
increase of technical requirements

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.



su1966

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

1DV.1 DR *Modification of Clause 1, first paragraph to replace with the following:*

1DV.1.1 This ~~part of IEC 60079~~ standard 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.

1DV.2 DR *Addition of 1DV.2.1*

1DV.2.1 Where references are made to IEC 60079 standards, the referenced requirements found in these standards shall apply as modified by any applicable U.S. National Differences.

2 Normative references

2DV D1 *Modification of Clause 2 references to replace with the following:*

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

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