



UL 60079-15

STANDARD FOR SAFETY

Explosive atmospheres – Part 15: Equipment protection by type of protection “n”

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UL Standard for Safety for Explosive atmospheres – Part 15: Equipment protection by type of protection "n", UL 60079-15

Fourth Edition, Dated February 15, 2013

Summary of Topics

ANSI/UL 60079-15 is an adoption of IEC 60079-15, the Standard for Safety for Explosive Atmospheres – Part 15: Equipment Protection by Type of Protection "n", (Edition 4.0, Issued by the IEC January 2010). Please note that the national difference document incorporates the U.S. national differences for UL 60079-15.

The requirements are substantially in accordance with Proposal(s) on this subject dated December 16, 2011 and May 25, 2012.

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The following table lists the future effective dates with the corresponding reference.

Future Effective Date	Reference
The effective dates for these new, revised or deleted requirements are being determined.	Entire standard





ISA – The International Society of Automation
ANSI/ISA 60079-15 (12.12.02)-2012
Fourth Edition



Underwriters Laboratories Inc.
ANSI/UL 60079-15
Fourth Edition

Explosive atmospheres – Part 15: Equipment protection by type of protection “n”

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This ANSI/UL Standard for Safety consists of the Fourth edition.

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General Notes

This is the common ISA and UL Standard for Explosive atmospheres – Part 15: Equipment protection by type of protection “n”. It is the Fourth edition of ANSI/ISA 60079-15 (superseding ANSI/ISA 60079-15 (12.12.02)-2009) and the Fourth edition of ANSI/UL 60079-15. This document is a modification of the IEC document and includes U.S. deviations encompassing both additions and deletions of information.

ANSI/ISA 60079-15 and ANSI/UL 60079-15 contain identical requirements, and identical publication dates. The presentation and format of the standards material may differ between the two published standards.

This common Standard was prepared by the International Society of Automation (ISA) and Underwriters Laboratories Inc. (UL).

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.

Level of harmonization

This standard adopts the IEC text with deviations.

The requirements are presented in different formats. The ISA version of the standard illustrates the national differences from the IEC text through the use of legislative text (strike-out and underline). The UL version of the standard illustrates national differences immediately following the IEC text. National differences between the UL version and the ISA version shall be word for word except for editorial changes.

Interpretations

The interpretation by the SDO of an identical or equivalent standard shall be based on the literal text to determine compliance with the standard in accordance with the procedural rules of the SDO. If more than one interpretation of the literal text has been identified, a revision shall be proposed as soon as possible to each of the SDOs to more accurately reflect the intent.

UL Effective Date

The effective date for UL is being determined.

A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

Preface (ISA)

This ISA standard is based on the 4th edition of IEC Publication 60079-15. It is the intention of the ISA12 Committee to develop an ANSI Standard that is harmonized with IEC 60079-15 to the fullest extent possible. This preface is included for informational purposes and is not part of ANSI/ISA-60079-15. The document is a modification of the IEC document and includes U.S. deviations encompassing both additions and deletions of information. The significant changes with respect to the previous edition are listed below:

- addition of equipment protection levels;
- removal of the requirements for energy-limited “nL” and associated energy limited apparatus “[nL]”;
- removal of the requirements for encapsulated Devices “nC”;
- requirements for electrical connections expanded and clarified;
- requirements for luminaire ballasts expanded and clarified;
- requirements for evaluation and testing of motor rotors clarified;
- 15 kV limit for equipment protection by type of protection “n” added;
- spacing requirement for voltages above 10 kV modified;
- requirements for restricted breathing enclosures modified;
- modification to requirements for motor rotors and stators;
- addition of Annex A (informative);
- undated references to IEC 60079-0 included.

The standards referenced within this document may contain provisions which, through reference in this text, constitute requirements of this document. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this document are encouraged to investigate the possibility of applying the most recent editions of the standards indicated within this document. Members of IEC and ISO maintain registers of currently valid International Standards. ANSI maintains registers of currently valid U.S. National Standards.

This document has been prepared as part of the service of International Society of Automation (ISA) toward a goal of uniformity in the field of instrumentation. To be of real value, this document should not be static but should be subject to periodic review. Toward this end, the Society welcomes all comments and criticisms and asks that they be addressed to the Secretary, Standards and Practices Board; ISA; 67 Alexander Drive; P. O. Box 12277; Research Triangle Park, NC 27709; Telephone (919) 549-8411; Fax (919) 549-8288; E-mail: standards@isa.org.

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National Differences

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60079-15, Explosive atmospheres – Part 15: Equipment protection by type of protection “n” are indicated by notations (differences) and are presented in bold text.

In the ISA publication of this standard, National Differences are presented using legislative text (strike-out and underline). The national difference type is identified in an informative annex.

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 printed standard includes the national difference types within the body of the text. The ISA printed standard includes the national difference types in an annex at the back of the standard.

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.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES – Part 15: Equipment protection by type of protection “n”

FOREWORD

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 nongovernmental 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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International Standard IEC 60079-15 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This fourth edition cancels and replaces the third edition, published in 2005, and constitutes a technical revision.

The significant technical changes with respect to the previous edition are as follows:

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- addition of equipment protection levels;
- removal of the requirements for energy-limited “nL” and associated energy limited apparatus “[nL]”;
- removal of the requirements for encapsulated Devices “nC”;
- requirements for electrical connections expanded and clarified;
- requirements for luminaire ballasts expanded and clarified;
- requirements for evaluation and testing of motor rotors clarified;
- 15 kV limit for equipment protection by type of protection “n” added;
- spacing requirement for voltages above 10 kV modified;
- requirements for restricted breathing enclosures modified;
- modification to requirements for motor rotors and stators;
- addition of Annex A (informative);
- undated references to IEC 60079-0 included.

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

FDIS	Report on voting
31/833/FDIS	31/853/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 International Standard is to be read in conjunction with IEC 60079-0.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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

- reconfirmed,
- withdrawn,
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Explosive atmospheres – Part 15: Equipment protection by type of protection “n”

1 Scope

This part of IEC 60079 specifies requirements for the construction, testing and marking for Group II electrical equipment with type of protection, “n” intended for use in explosive gas atmospheres. This standard applies to electrical equipment where the rated voltage does not exceed 15 kV r.m.s. a.c. or d.c.

1DV.1 DR Modification of Clause 1, first paragraph as follows:

1DV.1.1 Replace “part of IEC 60079” with “standard”.

This part of IEC 60079 is applicable to non-sparking electrical equipment and also to electrical equipment with parts or circuits producing arcs or sparks or having hot surfaces which, if not protected in one of the ways specified in this standard, could be capable of igniting a surrounding explosive gas atmosphere. This standard describes several different methods by which this can be achieved which may be combined with other methods described in IEC 60079-0.

1DV.2 DR Modification of Clause 1, second paragraph as follows:

1DV.2.1 Replace “part of IEC 60079” with “standard”.

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

Table 1 – Relationship of this part to IEC 60079-0

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
4	4	Equipment grouping	Applies	Applies	Applies
4.1	4.1	Group I	Excluded	Excluded	Excluded
4.2	4.2	Group II	Applies	Applies	Applies
4.3	4.3	Group III	Excluded	Excluded	Excluded
4.4	4.4	Equipment for a particular explosive atmosphere	Applies	Applies	Applies
5.1	5.1	Environmental influences	Applies	Applies	Applies
5.1.1	5.1.1	Ambient temperature	Applies	Applies	Applies
5.1.2	5.1.2	External source of heating or cooling	Applies	Applies	Applies
5.2	5.2	Service temperature	Applies	Applies	Applies
5.3.1	5.3.1	Determination of maximum surface temperature	Applies	Applies	Applies
5.3.2.1	5.3.2.1	Group I electrical equipment	Excluded	Excluded	Excluded
5.3.2.2	5.3.2.2	Group II electrical equipment	Applies	Applies	Applies

¹ Under consideration

Table 1 – Relationship of this part to IEC 60079-0 Continued

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
5.3.2.3	5.3.2.3	Group III electrical equipment	Excluded	Excluded	Excluded
5.3.3	5.3.3	Small component temperature for Group I and Group II electrical equipment	Applies	Applies	Excluded
6.1	6.1	General	Applies	Applies	Applies
6.2	6.2	Mechanical strength	Applies	Applies	Applies
6.3	6.3	Opening times	Excluded	Excluded	Applies
6.4	6.4	Circulating currents	Applies	Applies	Applies
6.5	6.5	Gasket retention	Applies	Applies	Applies
6.6	6.6	Electromagnetic and ultrasonic radiating equipment	Applies	Applies	Applies
7.1.1	7.1.1	Applicability	Applies	Applies	Applies
7.1.2	7.1.2	Specification of materials	Applies	Applies	Applies
7.1.3	7.1.2.2	Plastic materials	Applies	Applies	Applies
7.1.4	7.1.2.3	Elastomeric materials	Applies	Applies	Applies
7.2	7.2	Thermal endurance	Applies	Applies	Applies
7.3	7.3	Resistance to light	Applies	Applies	Applies
7.4	7.4	Electrostatic charges on external non-metallic materials	Applies	Applies	Applies
7.5	9.1	Threaded holes	Applies	Applies	Applies
8.1.1	8.2	Group I	Excluded	Excluded	Excluded
8.1.2	8.3	Group II	Applies	Applies	Applies
8.1.3	8.4	Group III	Excluded	Excluded	Excluded
8.2	9.1	Threaded holes	Applies	Applies	Applies
9.1	9.1	General	Applies	Applies	Applies
9.2	9.2	Special fasteners	Excluded	Excluded	Excluded
9.3	9.3	Holes for special fasteners	Excluded	Excluded	Excluded
10	10	Interlocking devices	Excluded	Excluded	Excluded
11	11	Bushings	Applies	Applies	Applies
12	12	Materials used for cementing	Modified	Modified	Modified
13	13	Ex components	Applies	Applies	Applies
14	14	Connection facilities and termination compartments	Modified	Modified	Modified
15	15	Connection facilities for earthing and bonding conductors	Applies	Applies	Applies
16	16	Entries into enclosures	Applies	Applies	Applies
17	17	Supplementary requirements for rotating electrical machines	Excluded	Modified	Excluded
18	18	Supplementary requirements for switchgear	Applies	Applies	Applies
19	19	Supplementary requirements for fuses	Modified	Modified	Modified
20	20	Supplementary requirements for plugs and sockets	Modified	Modified	Modified
21	21	Supplementary requirements for luminaires	Modified	Modified	Modified
22	22	Supplementary requirements for caplights and handlights	Applies	Applies	Applies

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Table 1 – Relationship of this part to IEC 60079-0 Continued

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
23	23	Equipment incorporating cells and batteries	Modified	Modified	Modified
24	24	Documentation	Applies	Applies	Applies
25	25	Compliance of prototype or sample with documents	Applies	Applies	Applies
26.1	26.1	General	Applies	Applies	Applies
26.2	26.2	Test configuration	Applies	Applies	Applies
26.3	26.3	Tests in explosive test mixtures	Applies	Applies	Applies
26.4	26.4	Tests of enclosures	Applies	Applies	Applies
26.4.1.1	26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	Applies	Applies	Applies
26.4.1.2.1	26.4.1.2.1	Group I electrical equipment	Excluded	Excluded	Excluded
26.4.1.2.2	26.4.1.2.2	Group II and Group III electrical equipment	Applies	Applies	Applies
26.4.2	26.4.2	Resistance to impact	Applies	Applies	Applies
26.4.3	26.4.3	Drop test	Applies	Applies	Applies
26.4.4	26.4.4	Acceptance criteria	Applies	Applies	Applies
26.4.5	26.4.5	Degree of protection by enclosure	Applies	Applies	Applies
26.5	26.5	Thermal tests	Applies	Applies	Applies
26.6	26.6	Torque test for bushings	Applies	Applies	Applies
26.7	26.7	Non-metallic enclosures or non-metallic parts of enclosures	Modified	Modified	Modified
26.8	26.8	Thermal endurance to heat	Modified	Modified	Modified
26.9	26.9	Thermal endurance to cold	Applies	Applies	Applies
26.10	26.10	Resistance to light	Applies	Applies	Applies
26.11	26.11	Resistance to chemical agents for Group I electrical equipment	Excluded	Excluded	Excluded
26.12	26.12	Earth continuity	Applies	Applies	Applies
26.13	26.13	Surface resistance test of parts of enclosures of non-metallic materials	Applies	Applies	Applies
26.14	–	Charging tests	Applies	Applies	Applies
26.15	26.14	Measurement of capacitance	Applies	Applies	Applies
27	27	Routine tests	Applies	Applies	Applies
28	28	Manufacturers responsibility	Applies	Applies	Applies
29	29	Marking	Applies	Applies	Applies
30	30	Instructions	Applies	Applies	Applies
Annex A	Annex A	Supplementary requirements for Ex cable glands	Applies	Applies	Applies
Annex B	Annex B	Requirements for Ex components	Applies	Applies	Applies
Annex C	Annex C	Example of rig for resistance to impact test	Applies	Applies	Applies
Annex D	Annex D	Introduction to an alternative risk assessment method encompassing “equipment protection levels” fro Ex equipment	Applies	Applies	Applies
Applies : this requirement of IEC 60079-0 is applied without change.					

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Table 1 – Relationship of this part to IEC 60079-0 Continued

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
Excluded : this requirement of IEC 60079-0 does not apply.					
Modified : this requirement of IEC 60079-0 is modified as detailed in this standard.					

Table 1DV DR Modification of Table 1 to replace with the following:

Table 1DV – Relationship of this part to IEC 60079-0

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2009) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
4	4	Equipment grouping	Applies	Applies	Applies
–	4.1	Group I	Excluded	Excluded	Excluded
4.2	4.2	Group II	Applies	Applies	Applies
4.3	4.3	Group III	Excluded	Excluded	Excluded
4.4	4.4	Equipment for a particular explosive atmosphere	Applies	Applies	Applies
5.1	5.1	Environmental influences	Applies	Applies	Applies
5.1.1	5.1.1	Ambient temperature	Applies	Applies	Applies
5.1.2	5.1.2	External source of heating or cooling	Applies	Applies	Applies
5.2	5.2	Service temperature	Applies	Applies	Applies
5.3.1	5.3.1	Determination of maximum surface temperature	Applies	Applies	Applies
–	5.3.2.1	Group I electrical equipment	Excluded	Excluded	Excluded
5.3.2.2	5.3.2.2	Group II electrical equipment	Applies	Applies	Applies
5.3.2.3	5.3.2.3	Group III electrical equipment	Excluded	Excluded	Excluded
5.3.3	5.3.3	Small component temperature for Group I and Group II electrical equipment	Applies	Applies	Excluded
6.1	6.1	General	Applies	Applies	Applies
6.2	6.2	Mechanical strength	Applies	Applies	Applies
6.3	6.3	Opening times	Excluded	Excluded	Applies
6.4	6.4	Circulating currents	Applies	Applies	Applies
6.5	6.5	Gasket retention	Applies	Applies	Applies
6.6	6.6	Electromagnetic and ultrasonic radiating equipment	Applies	Applies	Applies
7.1.1	7.1.1	Applicability	Applies	Applies	Applies
7.1.2	7.1.2	Specification of materials	Applies	Applies	Applies
7.1.3	7.1.2.2	Plastic materials	Applies	Applies	Applies
7.1.4	7.1.2.3	Elastomeric materials	Applies	Applies	Applies
7.2	7.2	Thermal endurance	Applies	Applies	Applies
7.3	7.3	Resistance to light	Applies	Applies	Applies

¹ Under consideration

Table 1DV – Relationship of this part to IEC 60079-0 Continued

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2009) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
7.4	7.4	Electrostatic charges on external non-metallic materials	Applies	Applies	Applies
7.5	9.1	Threaded holes	Applies	Applies	Applies
–	7.5	Accessible metal parts	Excluded	Excluded	Excluded
–	8.2	Group I	Excluded	Excluded	Excluded
8.1.2	8.3	Group II	Applies	Applies	Applies
8.1.3	8.4	Group III	Excluded	Excluded	Excluded
8.2	9.1	Threaded holes	Applies	Applies	Applies
9.1	9.1	General	Applies	Applies	Applies
9.2	9.2	Special fasteners	Excluded	Excluded	Excluded
9.3	9.3	Holes for special fasteners	Excluded	Excluded	Excluded
10	10	Interlocking devices	Excluded	Excluded	Excluded
11	11	Bushings	Applies	Applies	Applies
12	12	Materials used for cementing	Modified	Modified	Modified
13	13	Ex components	Applies	Applies	Applies
14	14	Connection facilities and termination compartments	Modified	Modified	Modified
15	15	Connection facilities for earthing and bonding conductors	Applies	Applies	Applies
16	16	Entries into enclosures	Applies	Applies	Applies
17	17	Supplementary requirements for rotating electrical machines	Excluded	Modified	Excluded
18	18	Supplementary requirements for switchgear	Applies	Applies	Applies
19	19	Supplementary requirements for fuses	Modified	Modified	Modified
20	20	Supplementary requirements for plugs and sockets	Modified	Modified	Modified
21	21	Supplementary requirements for luminaires	Modified	Modified	Modified
22	22	Supplementary requirements for caplights and handlights	Applies	Applies	Applies
23	23	Equipment incorporating cells and batteries	Modified	Modified	Modified
24	24	Documentation	Applies	Applies	Applies
25	25	Compliance of prototype or sample with documents	Applies	Applies	Applies
26.1	26.1	General	Applies	Applies	Applies
26.2	26.2	Test configuration	Applies	Applies	Applies
26.3	26.3	Tests in explosive test mixtures	Applies	Applies	Applies
26.4	26.4	Tests of enclosures	Applies	Applies	Applies
26.4.1.1	26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	Applies	Applies	Applies
–	26.4.1.2.1	Group I electrical equipment	Excluded	Excluded	Excluded
26.4.1.2.2	26.4.1.2.2	Group II and Group III electrical equipment	Applies	Applies	Applies
26.4.2	26.4.2	Resistance to impact	Applies	Applies	Applies

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Table 1DV – Relationship of this part to IEC 60079-0 Continued

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2009) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
26.4.3	26.4.3	Drop test	Applies	Applies	Applies
26.4.4	26.4.4	Acceptance criteria	Applies	Applies	Applies
26.4.5	26.4.5	Degree of protection by enclosure	Applies	Applies	Applies
26.5	26.5	Thermal tests	Applies	Applies	Applies
26.6	26.6	Torque test for bushings	Applies	Applies	Applies
26.7	26.7	Non-metallic enclosures or non-metallic parts of enclosures	Modified	Modified	Modified
26.8	26.8	Thermal endurance to heat	Modified	Modified	Modified
26.9	26.9	Thermal endurance to cold	Applies	Applies	Applies
26.10	26.10	Resistance to light	Applies	Applies	Applies
–	26.11	Resistance to chemical agents for Group I electrical equipment	Excluded	Excluded	Excluded
26.13	26.13	Surface resistance test of parts of enclosures of non-metallic materials	Applies	Applies	Applies
26.14	–	Charging tests	Applies	Applies	Applies
26.15	26.14	Measurement of capacitance	Applies	Applies	Applies
–	26.15	Verification of ratings of ventilating fans	Excluded	Excluded	Excluded
–	26.16	Alternative qualification of elastomeric sealing O-rings	Applies	Applies	Applies
27	27	Routine tests	Applies	Applies	Applies
28	28	Manufacturers responsibility	Applies	Applies	Applies
29	29	Marking	Applies	Applies	Applies
30	30	Instructions	Applies	Applies	Applies
Annex A	Annex A	Supplementary requirements for Ex cable glands	Applies	Applies	Applies
Annex B	Annex B	Requirements for Ex components	Applies	Applies	Applies
Annex C	Annex C	Example of rig for resistance to impact test	Applies	Applies	Applies
Annex D	Annex D	Introduction to an alternative risk assessment method encompassing “equipment protection levels” fro Ex equipment	Applies	Applies	Applies
–	Annex E	Temperature rise testing of electric machines	Applies	Applies	Applies
–	Annex F	Guideline flowchart for tests of non-metallic enclosures or non-metallic parts of enclosures	Applies	Applies	Applies
–	Annex G	Common standards – safety requirements for electrical equipment	Applies	Applies	Applies
–	Annex H	United States Major National Differences	Applies	Applies	Applies
–	Annex I	Equipment grounding	Applies	Applies	Applies

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Table 1DV – Relationship of this part to IEC 60079-0 Continued

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2009) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
Applies : this requirement of IEC 60079-0 is applied without change.					
Excluded : this requirement of IEC 60079-0 does not apply.					
Modified : this requirement of IEC 60079-0 is modified as detailed in this standard.					

NOTE 1 The clause number in the above table is shown for information only. The applicable requirements of IEC 60079-0 are identified by the clause title which is normative. This document was written against the specific requirements of IEC 60079-0 (ed. 5.0). The clause numbers for the previous edition are shown for information only. This is to enable the General Requirements IEC 60079-0 (ed. 5.0) to be used where necessary with this part of IEC 60079. Where there were no requirements, indicated by "NR" or there is a conflict between requirements, the later edition requirements take precedence.

NOTE 2 A non-incendive component is limited in use to the particular circuit for which it has been shown to be non-ignition capable and, therefore, cannot be separately assessed as complying with this standard.

NOTE 3 Compliance with this standard does not imply any removal of, or lowering of the requirements of any other standard with which the electrical equipment complies.

NOTE 4 This part of IEC 60079 supplements, and may enhance, the requirements for equipment for normal industrial applications. Where compliance with other IEC standards is indicated, such as IEC 60034 for motors and IEC 60598-2 for luminaires, proving compliance to those standards is normally the responsibility of the manufacturer.

NOTE 5 Type of protection "n" provides Equipment Protection Level (EPL) Gc. For further information, see IEC 60079-0.

1DV.3 DR Addition of 1DV.3.1

1DV.3.1 Where references are made to other 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.1 DR Modification of the title in Clause 2 as follows:

Delete "Normative".

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

IEC 60034 (all parts), *Rotating electrical machines*

IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC/TS 60034-25, *Rotating electrical machines – Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply*

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

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IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60079-0:2007, *Explosive atmospheres – Part 0: Equipment – General requirements*

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

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

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

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60228, *Conductors of insulated cables*

IEC 60238, *Edison screw lampholders*

IEC 60269-3, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Examples of standardized systems of fuses A to F*

IEC 60400, *Lampholders for tubular fluorescent lamps and starterholders*

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

IEC 60598 (all parts), *Luminaires*

IEC 60598-1:2008, *Luminaires – Part 1: General requirements and tests*

IEC 60598-2 (all parts), *Luminaires – Part 2: Particular requirements*

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

IEC 60927, *Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements*

IEC 60947-7-1, *Low-voltage switchgear and controlgear – Part 7-1: Ancillary equipment – Terminal blocks for copper conductors*

IEC 60947-7-2, *Low-voltage switchgear and controlgear – Part 7-2: Ancillary equipment – Protective conductor terminal blocks for copper conductors*

IEC 60998-2-4, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-4: Particular requirements for twist-on connecting devices*

IEC 60999-1, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

IEC 60999-2, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 2: Particular requirements for clamping units for conductors above 35 mm² up to 300 mm² (included)*

IEC 61048, *Auxiliaries for lamps – Capacitors for use in tubular fluorescent and other discharge lamp circuits – General and safety requirements*

IEC 61184, *Bayonet lampholders*

IEC 61195, *Double-capped fluorescent lamps – Safety specifications*

IEC 61347-1:2007, *Lamp controlgear – Part 1: General and safety requirements*

IEC 61347-2-1, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*

IEC 61347-2-2, *Lamp controlgear – Part 2-2: Particular requirements for d.c. or a.c. supplied electronic step-down convertors for filament lamps*

IEC 61347-2-3, *Lamp controlgear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps*

IEC 61347-2-4, *Lamp controlgear – Part 2-4: Particular requirements for d.c. supplied electronic ballasts for general lighting*

IEC 61347-2-7, *Lamp controlgear – Part 2-7: Particular requirements for d.c. supplied electronic ballasts for emergency lighting*

IEC 61347-2-8, *Lamp controlgear – Part 2-8: Particular requirements for ballasts for fluorescent lamps*

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)*

2DV.2 DR Modification of Clause 2 references to replace with the following:

**IEC 60034-1,
*Rotating electrical machines – Part 1: Rating and performance***

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

**IEC 60061-1,
*Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps***

**IEC 60068-2-27:2008,
*Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock***

**IEC 60081,
*Double-capped fluorescent lamps – Performance specifications***

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

IEC 60155,
Glow-starters for fluorescent lamps

IEC 60238,
Edison screw lampholders

IEC 60269-3,
Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Examples of standardized systems of fuses A to F

IEC 60400,
Lampholders for tubular fluorescent lamps and starterholders

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

IEC 60598 (all parts),
Luminaires

IEC 60598-1:2008,
Luminaires – Part 1: General requirements and tests

IEC 60598-2 (all parts),
Luminaires – Part 2: Particular requirements

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

IEC 60927,
Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements

IEC 60947-7-1,
Low-voltage switchgear and controlgear – Part 7-1: Ancillary equipment – Terminal blocks for copper conductors

IEC 60947-7-2,
Low-voltage switchgear and controlgear – Part 7-2: Ancillary equipment – Protective conductor terminal blocks for copper conductors

IEC 60998-2-4,
Connecting devices for low-voltage circuits for household and similar purposes – Part 2-4: Particular requirements for twist-on connecting devices

IEC 60999-1,
Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors above 0,2 mm² up to 35 mm² (included)

IEC 60999-2,
Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 2: General requirements and particular requirements for clamping units for conductors above 35 mm² up to 300 mm² (included)

IEC 61048,
Auxiliaries for lamps – Capacitors for use in tubular fluorescent and other discharge lamp circuits – General and safety requirements

IEC 61184,
Bayonet lampholders

IEC 61195,
Double-capped fluorescent lamps – Safety specifications

IEC 61347-1:2007,
Lamp controlgear – Part 1: General and safety requirements

IEC 61347-2-1,
Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)

IEC 61347-2-2,
Lamp controlgear – Part 2-2: Particular requirements for d.c. or a.c. supplied electronic step-down convertors for filament lamps

IEC 61347-2-3,
Lamp controlgear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps

IEC 61347-2-4,
Lamp controlgear – Part 2-4: Particular requirements for d.c. supplied electronic ballasts for general lighting

IEC 61347-2-7,
Lamp controlgear – Part 2-7: Particular requirements for d.c. supplied electronic ballasts for emergency lighting

IEC 61347-2-8,
Lamp controlgear – Part 2-8: Particular requirements for ballasts for fluorescent lamps

IEC 61347-2-9,
Lamp controlgear – Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)

NFPA 70,
National Electrical Code

UL 248-1
Low-Voltage Fuses, Part 1: General Requirements

UL 486A-486B
Wire Connectors

UL 746A
Polymeric Materials – Short Term Property Evaluations

UL 60079-0
Explosive atmospheres – Part 0: General requirements

UL 60079-1
Explosive atmospheres – Part 1: Equipment protection by Flameproof enclosures "d"

UL 60079-11
Explosive atmospheres – Part 11: Equipment protection by Intrinsic safety "i"

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60079-0 and the following apply.

3.1 cable sealing box auxiliary enclosure provided specifically for the purpose of sealing the insulation of a cable (for example, oil insulated cable) where it is connected to an apparatus

The enclosure may also provide for the connection of separate cable tails to the cable

3.2 clearance shortest distance in air between two conductive parts

3.3 creepage distance shortest distance along the surface of a solid insulating material in contact with air between two conductive parts

3.4 duty cycle repetitive variation of load in which the cycle time is too short for thermal equilibrium to be attained in the first cycle

[IEV 411-51-07]

3.5 separation shortest distance through solid insulating material between two conductive parts

3.6 sealing device device employing a method other than encapsulation to prevent the flow of a gas or a liquid between apparatus and a conduit by providing sealing facilities

3.7 type of protection "n" type of protection applied to electrical equipment such that, in normal operation and in certain specified regular expected occurrences, it is not capable of igniting a surrounding explosive gas atmosphere

NOTE 1 Additionally, the requirements of this standard are intended to ensure that a malfunction capable of causing ignition is not likely to occur.

NOTE 2 An example of a specified regular expected occurrence is a luminaire with failed lamp.

3.7.1 non-sparking device "nA" device constructed to minimize the risk of occurrence of arcs or sparks capable of creating an ignition hazard during conditions of normal operation

NOTE For the purposes of this standard normal operation is considered to exclude the removal or insertion of components with the circuit energized.

3.7.1DV DR Modification of Clause 3.7.1 to replace with the following:

non-sparking equipment “nA” equipment or component constructed to minimize the risk of occurrence of arcs or sparks capable of creating an ignition hazard during conditions of normal operation

NOTE For the purposes of this standard normal operation is considered to exclude the removal or insertion of components with the circuit energized.

3.7.2 devices and components “nC”

3.7.2DV DR Modification of Clause 3.7.2 title as follows:

Replace “devices” with “equipment”.

3.7.2.1 enclosed-break device “nC” device incorporating electrical contacts that are made and broken and that will withstand an internal explosion of the flammable gas or vapour which may enter it without suffering damage and without communicating the internal explosion to the external flammable gas or vapour

NOTE The principle difference between enclosed break devices “nC” and flameproof “d” are that the dimensions are not controlled and that safety factors have not been added.

3.7.2.1DV DR Modification of Clause 3.7.2.1, paragraph and NOTE as follows:

Replace “device” with “equipment”.

3.7.2.2 hermetically-sealed device “nC” device which is so constructed that the external atmosphere cannot gain access to the interior and in which the seal is made by fusion, for example by soldering, brazing, welding or the fusion of glass to metal

3.7.2.2DV DR Modification of Clause 3.7.2.2 paragraph as follows:

Replace “device” with “component”.

3.7.2.3 non-incendive component “nC” components having contacts for making or breaking a specified ignition capable circuit but in which the contacting mechanism is designed and constructed so that the component is not capable of causing ignition of the specified explosive gas atmosphere

NOTE The enclosure of the non-incendive component is not intended to either exclude the explosive gas atmosphere or contain an explosion. This is usually applied to specially constructed switch contacts that are mechanically designed to quench any arc or spark so that they are not a source of ignition.

3.7.2.4 sealed device “nC” device which is so constructed that it cannot be opened during normal service and is sealed effectively to prevent entry of an external atmosphere

3.7.2.4DV DR Modification of Clause 3.7.2.4 paragraph as follows:

Replace “device” with “component”.

3.7.3 **restricted-breathing enclosure “nR”** enclosure that is designed to restrict the entry of gases, vapours and mists

3.8 **test port** facility to test the integrity of restricted breathing equipment in the field after installation, during initial inspection and during maintenance

4 General

4.1 Equipment grouping and temperature classification

Equipment grouping and temperature classification shall be in accordance with the equipment grouping and temperature clauses of IEC 60079-0.

4.2 Potential ignition sources

In normal operation and in certain regular expected occurrences specified by this standard, the equipment shall not

- a) produce an operational arc or spark unless that arc or spark is prevented from causing ignition of a surrounding explosive atmosphere by one of the methods described in Clauses 16 to 20;
- b) develop a maximum surface temperature in excess of the maximum value appropriate to the temperature class of the equipment, unless the temperature of the surface or hot spot is prevented from causing ignition of a surrounding explosive atmosphere by one of the methods described in Clauses 16 to 20 as appropriate, or is otherwise shown to be safe as specified in 5.1.

Manually operated arcing or sparking components located within an enclosure that have been considered to be not accessible in normal operation without the use of a tool (see fastener general requirements of IEC 60079-0), may be evaluated as non-sparking (nA) components. These components shall be identified in the documentation prepared in accordance with the documentation requirements of IEC 60079-0.

5 Temperatures

5.1 Maximum surface temperature

The maximum surface temperature shall be determined in accordance with the determination of maximum temperature requirements of IEC 60079-0. The surface to be considered shall be:

- for nR equipment and nC equipment: the external surface of the equipment;
- for type nA equipment: the surface of any part of the electrical equipment, including the surface of internal parts to which the explosive gas atmosphere might have access

NOTE This may be the outside surface of “nC” components located within “nA” equipment.

5.2 Small components

For evaluation of small components, the small component temperature requirements of IEC 60079-0 applies. Temperature relaxations for thin wires and printed circuit tracks contained in IEC 60079-11 may also be used in application of this standard.

6 Requirements for electrical equipment

6.1 General

Electrical equipment with type of protection "n" shall comply with the requirements of this standard and the applicable parts of IEC 60079-0 for the method(s) of protection used.

6.2 Opening times

Except for nR restricted breathing enclosures, the opening time requirements of IEC 60079-0 do not apply.

6.3 Minimum degree of protection

6.3.1 General

Unless specified elsewhere in this standard, the enclosure of the equipment, when tested in accordance with IEC 60079-0 shall provide at least the degree of protection described in a) or b) unless safety would not be impaired by contact with solid foreign bodies or water (for example, strain gauges, resistance thermometers, or thermocouples). In this case, the documentation (see Clause 25) shall explain why and shall prescribe any special installation requirements which may be necessary and the equipment shall be marked with the symbol "X" to indicate this special condition of use (see the marking requirements of IEC 60079-0):

6.3.1DV.1 DR Modification of Clause 6.3.1, first paragraph as follows:

6.3.1DV.1.1 Delete "with the symbol of "X" " and replace "special" with "specific".

a) IP54 where there are bare live parts or IP44 where there are insulated live parts;

b) IP4X where there are bare live parts, or IP2X where there are insulated live parts and the equipment is intended for installation only in locations providing adequate protection against the entry of solid foreign objects or water capable of impairing safety, and the equipment is marked with the symbol "X" (see the marking requirements of IEC 60079-0).

6.3.1DV.2 DR Modification of Clause 6.3.1, item b) as follows:

6.3.1DV.2.1 Replace "with the symbol of "X" " with "to indicate this specific condition of use".

For protected equipment, the degree of protection shall be marked according to Clause 24.

NOTE 1 For requirements for rotating electrical machines, see Clause 8.

NOTE 2 For requirements for non-sparking low power equipment, see Clause 13.

6.3.2 Degree of protection provided by installation

Where the enclosure is completed by the installation of the equipment the marking shall include the symbol "X" and the manufacturer shall provide relevant information in the documentation in accordance with Clause 25.

6.3.2DV DR Modification of Clause 6.3.2 to replace with the following:

Where the enclosure is completed by the installation of the equipment and the equipment is marked to indicate this specific condition of use (see the marking requirements of IEC 60079-0) and the manufacturer shall provide relevant information in the documentation in accordance with Clause 25.

6.4 Clearances, creepage distances and separations

6.4.1 General

Clearances, creepage distances and separations between conductive parts at different potentials shall meet the appropriate values given in Table 2, except in the following cases:

- neutral point connections of rotating electrical machines complying with 8.6;
- luminaires complying with 11.2.5;
- with regard to sealing by conformal coating, encapsulated or solid insulation separations only, equipment subject to the routine electric strength test of 6.5.2;
- instruments and low power equipment complying with Clause 13.

A circuit which is not referred to earth in normal operation shall be assumed to be earthed at the point by which the highest voltage U is obtained.

6.4.2 Determination of working voltage

Clearances and creepage distances shall be determined as a function of the working voltage specified by the manufacturer of the equipment. Where the equipment is intended for more than one rated voltage or for a range of rated voltage, the value of the working voltage to be used shall be based on the highest value of rated voltage.