



National Differences For

UL 60079-0

Explosive Atmospheres - Part 0: Equipment - General Requirements

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ANSI/UL 60079-0 is an adoption of IEC 60079-0, the Standard for Safety for Explosive Atmospheres – Part 0: Equipment – General Requirements, issued by the IEC June 2011). Please note that the national difference document incorporates all of the U.S. national differences for UL 60079-0.

This document provides a single listing of the National Differences included in the UL adoption of the corresponding IEC standard.

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Preface

This document provides a single listing of the technical National Differences included in the UL adoption of the corresponding IEC standard.

In its IEC-based standards, UL uses the notations indicated below to identify national difference type, and these types are additionally noted in this document. The standard may not use all types of these deviations.

D1 - These are deviations which are based on basic safety principles and requirements, elimination of which would compromise safety for U.S. consumers and users of products.

D2 - These are deviations based on safety practices. These are deviations for IEC requirements that may be acceptable, but adopting the IEC requirements would require considerable retesting or redesign on the manufacturer's part.

DC - These are deviations 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 deviations based on editorial comments or corrections.

DR - These are deviations 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.

National Differences

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

1DV.1.1 This standard specifies the general requirements for construction, testing and marking of electrical equipment and Ex Components intended for use in explosive atmospheres. Explosive atmospheres are identified by the National Electrical Code®, NFPA 70 as hazardous (classified) locations and include the following specified locations:

- Class I, Zone 0
- Class I, Zone 1
- Class I, Zone 2
- Zone 20
- Zone 21
- Zone 22

See 6.1 for the relationship of the Equipment Protection Level (EPL) to the zone area classification.

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

1DV.2.1 Delete “(IEC 60079-1)” and “(IEC 60079-11)”

1DV.3 DR Modification of Clause 1 to delete NOTE 3.

1DV.3.1 This NOTE does not apply.

1DV.4 DR Modification of Clause 1, sixth paragraph to replace with the following:

- ISA 60079-2: Gas – Pressurized enclosures “p”;
- ISA 60079-31: Dust – Protection by enclosure “t”;
- ISA 61241-4: Dust – Pressurization “pD”;
- UL 60079-1: Gas – Flameproof enclosures “d”;
- UL 60079-5: Gas – Powder filling “q”;
- UL 60079-6: Gas – Oil immersion “o”;
- UL 60079-7: Gas – Increased safety “e”;
- UL 60079-11: Gas – Intrinsic safety “i”;

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- UL 60079-15: Gas – Type of protection “n”;
- UL 60079-18: Gas and dust – Encapsulation “m”;

1DV.5 DR Modification of Clause 1, sixth paragraph to replace with the following which deletes IEC 60079-13, IEC 62013-1, IEC 60079-30-1 and adds ANSI/IEEE 514 and NOTE 7:

1DV.5.1 This standard is supplemented or modified by the following equipment standards:

ISA 60079-25 (12.02.05): Explosive atmospheres – Part 25: Intrinsically safe electrical systems

IEC 60079-26 (12.00.03): Explosive atmospheres – Part 26: Equipment with equipment protection level (EPL) Ga

IEC 60079-28 (12.21.02): Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation

ANSI/IEEE 515: Standard for Testing, Design, Installation, and Maintenance of Electrical Heat Tracing for Industrial Applications.

NOTE 7 Components such as power connections, splices, end terminations, as well as cable entries, fittings, and seals, are to be evaluated according to the type of protection employed.

1DV.6 DR Addition of 1DV.6.1

1DV.6.1 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.

2DV.1 DR Modification of the title in Clause 2 as follows:

2DV.1.1 Delete “Normative”.

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

2DV.2.1 IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5, *Rotating electrical machines – Part 5: Classification of degrees of protection provided by the enclosures of rotating electrical machines (IP Code)*

IEC 60050-426, *International Electrotechnical Vocabulary (IEV) – Chapter 426: Electrical apparatus for explosive atmospheres*

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

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

IEC 60095-1, *Lead-acid starter batteries – Part 1: General requirements and methods of test*

IEC 60192, *Low-pressure sodium vapour lamps – Performance specifications*

IEC 60216-1, *Electrical insulating materials – Properties of thermal endurance – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-2, *Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

IEC 60243-1, *Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60254 (all parts), *Lead-acid traction batteries*

IEC 60423, *Conduits for electrical purposes – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

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

IEC 60622, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Sealed nickel-cadmium prismatic rechargeable single cells*

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

IEC 60662, *High-pressure sodium vapour lamps*

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

IEC 60896-11, *Stationary lead-acid batteries – Part 11: Vented types – General requirements and methods of tests*

IEC 60896-21, *Stationary lead-acid batteries – Part 21: Valve regulated types – Methods of test*

IEC 60952 (all parts), *Aircraft batteries*

IEC 61056-1, *General purpose lead-acid batteries (valve-regulated types) – Part 1: General requirements, functional characteristics – Methods of tests*

IEC 61427, *Secondary cells and batteries for photovoltaic energy systems (PVES) – General requirements and methods of test*

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

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

IEC 61960, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications*

IEC 62013-1, *Caplights for use in mines susceptible to firedamp – Part 1: General requirements – Construction and testing in relation to the risk of explosion*

ISA 60079-2 (12.04.01) *Electrical Apparatus for Explosive Gas Atmospheres – Part 2 Pressurized Enclosures “p”*

ISA 60079-25, *Explosive Atmospheres – Part 25: Intrinsically Safe Systems*

ISA 60079-26 (12.00.03), *Electrical Equipment for Use in Class I, Zone 0 Hazardous (Classified) Locations*

ISA 60079-28, *Explosive Atmospheres – Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*

ISA 60079-31, *Explosive Atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure “t”*

ISA 61241-42 (12.10.06) *Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization “pD”*

ISO 178, *Plastics – Determination of flexural properties*

ISO 179 (all parts), *Plastics – Determination of Charpy impact properties*

ISO 262, *ISO general-purpose metric screw threads – Selected sizes for screws, bolts and nuts*

ISO 273, *Fasteners – Clearance holes for bolts and screws*

ISO 286-2, *ISO system of limits and fits – Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO 527-2, *Plastics – Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics*

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

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

constructional screw threads

ISO 1817, *Rubber, vulcanized – Determination of the effect of liquids*

ISO 3601-1, *Fluid power systems – O-rings – Part 1: Inside diameters, cross-sections, tolerances and designation codes*

ISO 3601-2, *Fluid power systems – O-rings – Part 2: Housing dimensions for general applications*

ISO 4014, *Hexagon head bolts – Product grades A and B*

ISO 4017, *Hexagon head screws – Product grades A and B*

ISO 4026, *Hexagon socket set screws with flat point*

ISO 4027, *Hexagon socket set screws with cone point*

ISO 4028, *Hexagon socket set screws with dog point*

ISO 4029, *Hexagon socket set screws with cup point*

ISO 4032, *Hexagon nuts, style 1 – Product grades A and B*

ISO 4762, *Hexagon socket head cap screws*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 7380, *Hexagon socket button head screws*

ISO 14583, *Hexalobular socket pan head screws*

NFPA 70:2011, *National Electrical Code*

UL 347 *High Voltage Industrial Control Equipment*

UL 486E *Equipment Wiring Terminals for use with Aluminum and/or Copper Conductors*

UL 508 *Industrial Control Equipment*

UL 746B *Polymeric Materials – Long-Term Property Evaluations*

UL 746C *Polymeric Materials – Used in Electrical Equipment Evaluations*

UL 60079-1 *Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures "d"*

UL 60079-5 *Explosive Atmospheres – Part 5: Equipment Protection by Powder Filling "q"*

UL 60079-6 *Explosive Atmospheres – Part 6: Equipment Protection by Oil Immersion "o"*

UL 60079-7 *Explosive Atmospheres – Part 7: Equipment Protection by Increased Safety "e"*

UL 60079-11 *Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety "i"*

UL 60079-15 *Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Construction, Test*

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and Marking of Type of Protection "n" Electrical Apparatus

UL 60079-18 *Electrical Apparatus for Explosive Gas Atmospheres – Part 18: Construction, Test and Marking of Type of Protection Encapsulation "m" Electrical Apparatus*

UL 60947-1 *Low-Voltage Switchgear and Controlgear – Part 1: General Rules*

3.18.1DV *DR Modification of Clause 3.18.1 to replace with the following:*

combustible dust – dust particles that are 500 microns or smaller (material passing a U.S. No. 35 Standard Sieve as defined in ASTM E 11, Standard Specification for Wire Cloth and Sieves for Testing Purposes) and present a fire or explosion hazard when dispersed and ignited in air.

NOTE 1 This includes dust and grit as defined in ISO 4225.

NOTE 2 The term solid particles is intended to address particles in the solid phase and not the gaseous or liquid phase, but does not preclude a hollow particle.

NOTE 3 See ASTM E 1226, Standard Test for Explosibility of Dust Clouds or ISO 6184/1, Explosion Protection Systems – Part 1: Determination of explosion indices of combustible dusts in air, for procedures for determining the explosibility of dusts. Dusts are considered to be combustible dusts unless it has been confirmed by the test that they are not combustible dusts per ISO 6184/1 or ANSI/ASTM E1226.

3.18.1.1DV *DR Modification of Clause 3.18.1.1 to replace with the following and deletion of NOTE:*

conductive dust – combustible metal dust

3.18.1.2DV *DR Modification of Clause 3.18.1.2 to replace with the following and deletion of NOTE:*

non-conductive dust – combustible dust other than combustible metal dust

3.26DV *DR Modification of Clause 3.26, NOTE to replace with the following:*

NOTE Although the marking identifying the equipment protection level (EPL) may appear on equipment evaluated against this standard, the 2011 NEC does not recognize the concept of employing the equipment protection level in a complete risk assessment during the area classification of an installation. EPLs are designated as G for gas, D for dust, or M for mining and are then followed by a letter (a, b, or c) to give the user a better understanding as to whether the equipment provides either (a) a "very high," (b) a "high," or (c) an "enhanced" level of protection against ignition of an explosive atmosphere. Therefore, this document reflects that a very high level of protection (a) is used for Zone 0 and Zone 20, a high level of protection (b) is used for Zone 1 and Zone 21 and an enhanced level of protection (c) is used for Zone 2 and Zone 22.

3.28DV *DR Modification of Clause 3.28 to replace as follows:*

Delete " , marked with the symbol "U", "

3.46.5DV *DR Modification of Clause 3.46.5 to replace with the following:*

threshold power combustible dust P_{th} – product of the effective output power of the transmitter multiplied by the antenna gain

NOTE 1 The gain is produced by an antenna concentrating radiation in a particular direction and is always related to a specified reference antenna.

NOTE 2 The threshold power is considered to be equal to the Effective Isotropic Radiated Power (EIRP) per ITU-R BS.561.2.

NOTE 3 Cables and connections introduce additional gain (loss).

3.52DV DR Delete Clause 3.52:

This clause does not apply.

3.53DV DR Delete Clause 3.53:

This clause does not apply.

3.60ADV.1 DR Add the following definition to Clause 3:

3.60ADV.1.1 cord connector – a fitting intended to terminate a cord to a box or similar device and reduce the strain at points of termination and may include an explosionproof, dust-ignitionproof, or flameproof seal

4.1DV.1 DR Modification of Clause 4.1, NOTE as follows:

4.1DV.1.1 Replace “NOTE” with “NOTE 1”

4.1DV.2 DR Modification of Clause 4.1 to add the following NOTE after the second paragraph:

4.1DV.2.1 NOTE 2 In the US, the authority having jurisdiction for underground mines is the Mine Safety and Health Administration (MSHA) of the federal government. There are additional regulations beyond the requirements detailed here will also apply.

4.2DV.1 DR Modification of Clause 4.2, second paragraph NOTE 1 as follows:

4.2DV.1.1 Add “and NFPA 497” after “IEC 60079-20-1”

4.3DV.1 DR Modification of Clause 4.3, third paragraph NOTE to replace with the following:

4.3DV.1.1 NOTE 1 Equipment marked IIIB is suitable for applications requiring Group IIIA equipment. Similarly, equipment marked IIIC is suitable for applications requiring Group IIIA or Group IIIB equipment.

4.3DV.1.2 NOTE 2 The 2011 NEC does not recognize the identification of locations or equipment as “Group IIIA, IIIB, or IIIC”, but identifies equipment suitable for Zone 20, 21, or 22 and no separate differentiation is made of combustible dusts or ignitable fibers.

5.1.1DV.1 DR Modification of Clause 5.1.1 to replace with the following:

5.1.1DV.1.1 Electrical equipment designed for use in a normal ambient temperature range of –20 °C to +40 °C does not require marking of the ambient temperature range. However, electrical equipment designed for use outside this normal ambient temperature range is considered to be special. Electrical equipment can be designed for an upper ambient

temperature of greater than +40 °C and can be designed for a lower ambient temperature of less than –20 °C as long as the equipment is evaluated to the applicable requirements in this standard and to the applicable requirements for the type of protection standards found in Clause 1. The marking shall then include either the symbol T_a or T_{amb} together with both the upper and lower ambient temperatures. See Table 1.

NOTE The ambient temperature range may be an expanded range, e.g. $-55\text{ °C} \leq T_{amb} \leq 150\text{ °C}$.

Table 1DV – Ambient temperatures in service and additional marking

Electrical equipment	Ambient temperature in service	Additional marking
Normal	Maximum: +40 °C Minimum: –20 °C	None
Special	Specified by the manufacturer	T_a or T_{amb} with the special range, for example, $-30\text{ °C} \leq T_a \leq +40\text{ °C}$

5.3.2.3.1DV DR Modification of Clause 5.3.2.3.1 Title as follows:

Delete “without a dust layer”

5.3.2.3.2DV DR Delete Clause 5.3.2.3.2:

This clause does not apply

5.3.3DV.1 DR Modification of Clause 5.3.3, first paragraph to add the following NOTE after item c):

5.3.3DV.1.1 NOTE b) and c) do not apply to small components, such as those commonly used in gas detection instruments, that produce a surface temperature rise as a result of a catalytic or other chemical reaction

6.1DV DR Modification of Clause 6.1 to replace with the following:

Electrical equipment and Ex Components shall

a) comply with the requirements of this standard, together with one or more of the specific standards listed in Clause 1, and

NOTE 1 These specific standards may vary the requirements of this standard.

NOTE 2 All of the requirements for cable glands or cord connectors marked as type of protection “d”, “e”, “t”, and “td” are located in UL 2225.

b) comply with the applicable requirements for similar equipment for use in unclassified locations.

NOTE 3 Requirements for safety of electrical equipment in ordinary (unclassified) locations can be found in ANSI Standards, NEMA Standards, Federal Regulations, etc. Equipment listed by a Nationally Recognized Testing Laboratory is considered to meet the applicable requirements found in these standards. A list of commonly applied standards is shown in informative Annex G.

NOTE 4 If the electrical equipment or Ex Component is intended to withstand particularly adverse service conditions (for example, rough handling, humidity effects, ambient temperature variations, effects of chemical agents, corrosion), these should be specified to the manufacturer by the user. If certification is sought, it is not a requirement of this standard that the certification body confirm suitability for the adverse conditions. Special precautions should be taken when vibration effects on terminals, fuse holders, lampholders and current-carrying connections in general may impair safety, unless they comply with specific standards.

When applying this standard, the EPL designations shown shall be taken as meaning equipment suitable for the zone classifications as shown in Table 3C.

Table 3c – Relationship of EPLs to NEC Zones

EPL Designation	NEC Zone Classification
Ga	Class I, Zone 0
Gb	Class I, Zone 1
Gc	Class I, Zone 2
Da	Zone 20
Db	Zone 21
Dc	Zone 22
Ma	Not Applicable
Mb	Not Applicable

NOTE 5 Although the marking identifying the equipment protection level (EPL) may appear on equipment evaluated against this standard, the 2011 NEC does not recognize the concept of employing the equipment protection level in a complete risk assessment of an installation.

6.6.1DV.1 DR Modification of Clause 6.6.1, first paragraph, last sentence to replace with the following:

6.6.1DV.1.1 Programmable or software control intended for setting by the user that would increase the power thresholds above these levels shall not be permitted.

6.6.1DV.2 DR Modification of Clause 6.6.1, second paragraph to add NOTE 4 as follows:

6.6.1DV.1.2 NOTE 4 For pulsed radio frequency transmissions, the thermal initiation time is applicable to the duration of a single pulse and the threshold energy is the maximum energy of a single pulse.

6.6.2DV DR Modification of Clause 6.6.2 to replace with the following:

NOTE The requirements for laser and other continuous wave sources can be found in ISA 60079-28.

7.1.1DV DR Modification of Clause 7.1.1, NOTE 1 to replace with the following:

Some examples of non-metallic parts of enclosures upon which the type of protection depends include cover sealing rings of an “e” or “t” enclosure, seals of switch actuators for an “e” enclosure, etc.

7.1.2.3DV.1 DR Modification of Clause 7.1.2.3, first paragraph to add the following NOTE after item (d):

7.1.2.3DV.1.1 NOTE 1 The COT may be determined using UL 157.