

AMERICAN NATIONAL STANDARD

**ANSI/ISA-60079-1 (12.22.01)-2009
Supercedes ANSI/ISA-60079-1 (12.22.01)-2005**

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

Approved 10 April 2009

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International Society of Automation
ANSI/ISA-60079-1 (12.22.01)-2009
Sixth Edition

Underwriters Laboratories Inc.
ANSI/UL 60079-1
Sixth Edition



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

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General Notes

This is the common ISA and UL standard for Explosive Atmospheres - Part 1: Equipment Protection by Flameproof Enclosures "d". It is the sixth edition of ANSI/ISA-60079-1 (superceding ANSI/ISA-60079-1 (12.22.01)-2005) and the sixth edition of ANSI/UL 60079-1. The document is a modification of the IEC document and includes U.S. deviations encompassing both additions and deletions of information.

ANSI/ISA-60079-1 and ANSI/UL 60079-1 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).

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 requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, Classification, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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Preface (ISA)

This ISA standard is based on IEC Publication 60079-1. It is the intention of the ISA12 Committee to develop an ANSI Standard that is harmonized with IEC 60079-1 to the fullest extent possible. This preface is included for informational purposes and is not part of ANSI/ISA-60079-1. The document is a modification of the IEC document and includes U.S. deviations encompassing both additions and deletions of information.

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.

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National Differences

GENERAL

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60079-1, Ed. 6, Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d", copyright 2007, 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 based on **safety practices**. These are differences 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 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 or figure. 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 or figure 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, or figure of the base IEC text.

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Foreword (ISA)

All text of IEC 60079-1:2007 (Edition 6) is included. U.S. National Deviations are shown by ~~strikeout~~ through text deleted and underline under text added. Tables, or portions of tables, that are to be deleted are shown as shaded; figures to be deleted are marked with the overlay "X." There are nine annexes in this standard. Annexes A, B, C, and E are normative and are considered part of this standard. Annexes D, F, G, H, and I are informative and are not considered part of this standard.

This edition contains the following significant technical changes with regard to the IEC previous edition:

- a) revisions to Clause 5 regarding markings and conditions of safe use when a dimension of a flameproof joint is other than the relevant minimum or maximum;
- b) revisions to Table 1 regarding maximum gap for flanged, cylindrical or spigot joints;
- c) revisions to Table 4 regarding requirements for taper threaded joints;
- d) revisions to Clause 10 regarding volume restrictions and test conditions associated with breathing and draining devices;
- e) revisions to Clause 11 regarding requirements for fasteners, associated holes and blanking elements;
- f) revisions to Clause 12 regarding material restrictions associated with zinc and zinc alloys;
- g) revisions to Table 5 regarding conditions for the determination of maximum surface temperatures;
- h) revisions to Clause 15 regarding the determination of explosion pressure (reference pressure);
- i) revisions to Table 6 regarding the reduction in length of a threaded joint for non-transmission testing;
- j) revisions to Table 7 regarding the test factors to increase pressure or test gap (i_E);
- k) revisions to Table 8 regarding the minimum distance of obstructions from flange openings;
- l) revisions to Clause 19 regarding tests for flameproofness;
- m) revisions to Clause 20 regarding a tabulated collection of marking requirements;
- n) revisions to Annex C regarding additional requirements for flameproof entry devices;
- o) revisions to Annex D regarding empty flameproof enclosures as Ex components;
- p) addition of a new Annex F regarding mechanical properties for screws and nuts; and
- q) addition of a new Annex G regarding equipment protection levels for Ex equipment.

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1 Scope

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 Class I, Zone 1, explosive gas atmospheres.

This standard supplements and modifies the general requirements of ~~IEC 60079-0~~ ANSI/ISA-60079-0. Where a requirement of this standard conflicts with a requirement of ~~IEC 60079-0~~ ANSI/ISA-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 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 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 atmospheres – Part 0: General requirements*~~

ANSI/ISA-60079-0:2005, *Electrical apparatus for use in Class I, Zones 0, 1, & 2 hazardous (classified) locations – 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”*~~

ANSI/ISA-60079-7, *Electrical apparatus for use in Class I, Zone 1 hazardous (classified) locations – Type of protection increased safety “e”*

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

ANSI/ISA-60079-11, *Electrical apparatus for use in Class I, Zones 0, 1, & 2 hazardous (classified) locations – Type of protection intrinsic safety “i”*

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

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*