UL 60079-6

STANDARD FOR SAFETY

Explosive atmospheres – Part 6: Equipment protection by liquid immersion "o"

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UL Standard for Safety for Explosive Atmospheres – Part 6: Equipment Protection by Liquid Immersion "o", UL 60079-6

Fourth Edition, Dated April 29, 2016

Summary of Topics

This reaffirmation of ANSI/UL 60079-6 dated November 14, 2024 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

This standard is an adoption of IEC 60079-6, Explosive Atmospheres – Part 6: Equipment Protection by Liquid Immersion "o" (fourth edition issued by IEC February 2015) with US National Differences.

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated September 27, 2024.

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APRIL 29, 2016
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UL 60079-6

Standard for Explosive Atmospheres – Part 6: Equipment Protection by Liquid Immersion "o"

First Edition – December, 2002
Second Edition – March, 2007
Third Edition – July, 2009

Fourth Edition

April 29, 2016

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through November 14, 2024.

The most recent designation of ANSI/UL 60079-6 as a Reaffirmed American National Standard (ANS) occurred on November 14, 2024. 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 ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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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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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.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES – Part 6: Equipment protection by liquid immersion "o"

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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International Standard IEC 60079-6 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This fourth edition cancels and replaces the third edition, published in 2007. This edition constitutes a technical revision.

The significant changes with respect to the previous edition are listed below:

– Edition 4 represents a major technical revision of the requirements for oil immersion “o” and should be considered as introducing all new requirements. The normal “Table of Significant Changes” has not been included for this reason. In particular:

- The requirements for oil immersion “o” have been redefined into liquid immersion , levels of protection “ob” and “oc” as recommended by the responses to 31/715/DC
- The ability to protect sparking contacts has been added to both “ob” and “oc”

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– Additional requirements have been introduced for the protective liquid.

This part of IEC 60079 is to be used in conjunction with IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*.

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

FDIS	Report on voting
31/1157/FDIS	31/1172/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, 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 website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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EXPLOSIVE ATMOSPHERES – Part 6: Equipment protection by liquid immersion "o"

1 Scope

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

1DV.1.1 This standard ~~part of IEC 60079~~ specifies the requirements for the design, construction, testing and marking of Ex Equipment and Ex Components with type of protection liquid immersion "o" intended for use in explosive gas atmospheres.

Ex Equipment and Ex Components of type of protection liquid immersion "o" are either:

- Level of Protection "ob" (EPL "Mb" or "Gb")
- Level of Protection "oc" (EPL "Gc")

For Level of Protection "ob", this standard applies where the rated voltage does not exceed 11 kV r.m.s. a.c. or d.c.

For Level of Protection "oc", this standard applies where the rated voltage does not exceed 15 kV r.m.s. a.c. or d.c.

NOTE Requirements for higher voltages are under consideration.

1DV.2 DR *Modification of Clause 1, fifth paragraph to replace with the following:*

1DV.2.1 This standard supplements and modifies the general requirements of UL 60079-0 ~~IEC 60079-0~~. Where a requirement of this standard conflicts with a requirement of UL 60079-0 ~~IEC 60079-0~~, the requirement of this standard takes precedence.

2 Normative references

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

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

~~IEC 60079-0, Explosive Atmospheres – Part 0: Equipment – General requirements~~

IEC 60156, *Insulating liquids – Determination of the breakdown voltage at power frequency – Test method*

IEC 60247, *Insulating liquids – Measurement of relative permittivity, dielectric dissipation factor (tan δ) and d.c. resistivity*

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IEC 60296, ***Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear***

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

IEC 60814, ***Insulating liquids – Oil impregnated paper and pressboard – Determination of water by automatic coulometric Karl Fischer titration***

IEC 60836, ***Specifications for unused silicone insulating liquids for electrotechnical purposes***

IEC 61099, ***Insulating liquids – Specifications for unused synthetic organic esters for electrical purposes***

IEC 61125, ***Unused hydrocarbon based insulating liquids – Test methods for evaluating the oxidation stability***

IEC 62021-1, ***Insulating liquids – Determination of acidity – Part 1: Automatic potentiometric titration***

IEC 62535, ***Insulating liquids – Test method for detection of potentially corrosive sulphur in used and unused insulating oil***

ISO 2592, ***Determination of flash and fire points – Cleveland open cup method***

ISO 2719, ***Determination of flash point – Pensky-Martens closed cup method***

ISO 3016, ***Petroleum oils – Determination of pour point***

ISO 3104, ***Petroleum products – Transparent and opaque liquids – Determination of kinematic viscosity and calculation of dynamic viscosity***

UL 60079-0, ***Explosive Atmospheres Part 0: Equipment – General Requirements***

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 **liquid immersion "o"** type of protection in which the electrical equipment or parts of the electrical equipment are immersed in a protective liquid in such a way that an explosive gas atmosphere which may be above the liquid or outside the enclosure cannot be ignited

3.2 **protective liquid** liquid which prevents the explosive atmosphere from making direct contact with potential ignition sources

3.3 **sealed equipment** equipment designed and constructed in such a manner as to prevent ingress of an external atmosphere during the expansion and contraction of the internally contained liquid during normal operation, for example, by means of an expansion vessel

3.4 **non-sealed equipment** equipment designed and constructed in such a manner as to allow the ingress and egress of an external atmosphere during the expansion and contraction of the internally contained fluid during normal operation

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3.5 **maximum permissible protective liquid level** maximum level that the protective liquid can attain in normal service, taking into account the effects of expansion from the worst-case filling condition specified by the manufacturer to the condition of full load at maximum ambient temperature for which the equipment is designed

3.6 **minimum permissible protective liquid level** minimum level that the protective liquid can attain in normal service taking into account the effects of contraction from the worst-case filling condition to the condition of de-energization at minimum ambient temperature

3.7 **disconnector** mechanical switching device which provides, in the open position, an isolating distance in accordance with specified requirements

Note 1 to entry: A disconnector is capable of opening and closing a circuit when either negligible current is broken or made, or when no significant change in the voltage across the terminals of each of the poles of the disconnector occurs. It is also capable of carrying currents under normal circuit conditions and carrying for a specified time currents under abnormal conditions such as those of short circuit.

[SOURCE: IEC 60050-441:1984, 441-14-05]

3.8 **switching device** device designed to make or break the current in one or more electric circuits

[SOURCE: IEC 60050-441:1984, 441-14-01]

3.9 **safety device** device intended for use inside or outside explosive atmospheres but required for or contributing to the safe functioning of equipment and protective systems with respect to the risks of explosion

3.10 **tap selector** device designed to carry, but not to make or break current, used in conjunction with a diverter switch to select tapping connections

[SOURCE: IEC 60050-421:1990, 421-11-02]

4 Constructional requirements

4.1 General

For Type of Protection “liquid immersion “o”, the Ex Equipment or parts of the Ex Equipment are immersed in a protective liquid in such a way that an explosive gas atmosphere, which may be above the liquid or outside the enclosure, cannot be ignited.

The Ex Equipment is constructed to ensure that the necessary amount of protective liquid is present. Dependent on the intended Equipment Protection Level, this is achieved by monitoring device(s), indicator(s) or a level control safety device with automatic switch off.

4.1DV.1 DR *Modification of Clause 4.1 NOTE to replace with the following:*

NOTE In accordance with the requirements for all electrical equipment given in UL 60079-0 ~~IEC 60079-0~~, it is assumed that the relevant industrial requirements have been applied. The requirements of the UL 60079-0 and its sub-parts ~~IEC 60079 series of standards~~ supplement those industrial requirements.

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