



UL 60079-18

STANDARD FOR SAFETY

Explosive Atmospheres – Part 18: Equipment
Protection by Encapsulation “m”

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UL Standard for Safety for Explosive Atmospheres – Part 18: Equipment Protection by Encapsulation “m”,
UL 60079-18

Fourth Edition, Dated December 14, 2015

Summary of Topics

This revision to the Adoption of IEC 60079-18, Explosive Atmospheres – Part 18: Equipment Protection by Encapsulation “m”, (fourth edition issued December 2014) as a new IEC-based UL standard, UL 60079-18 (IEC 60079-18:2014) with US National Differences is being issued to include the following:

Revision for 10 e) to align with the tests as specified in 8.2.2 and correct the conflict with the NEC.

Text that has been changed in any manner or impacted by UL’s electronic publishing system is marked with a vertical line in the margin. Changes in requirements are marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated January 29, 2016.

THIS FOURTH EDITION REPLACES THE THIRD EDITION. AS OF DECEMBER 14, 2020, THE THIRD EDITION OF UL 60079-18 WILL BE WITHDRAWN.

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December 14, 2015
(Title Page Reprinted: March 14, 2016)



ANSI/UL 60079-18-2016

1

UL 60079-18

**Standard for Explosive Atmospheres - Part 18: Equipment Protection by
Encapsulation "m"**

Fourth Edition

December 14, 2015

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through March 14, 2016.

The most recent designation of ANSI/UL 60079-18 as an American National Standard (ANSI) occurred on March 14, 2016. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface, or effective date information. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

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

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CONTENTS

PREFACE	4
National Differences	7
FOREWORD	8
1 Scope	11
2 Normative references	11
3 Terms and definitions	13
4 General	13
4.1 Level of protection (equipment protection level (EPL))	13
4.2 Additional requirements for level of protection “ma” and “mb”	14
4.3 Additional requirements for level of protection “ma”	14
4.4 Rated voltage and prospective short circuit current	14
5 Requirements for compounds	14
5.1 General	14
5.2 Specification	14
5.3 Properties of the compound	15
6 Temperatures	15
6.1 General	15
6.2 Determination of the limiting temperature	16
6.3 Temperature limitation	16
7 Constructional requirements	16
7.1 General	16
7.2 Determination of faults	17
7.3 Free space in the encapsulation	20
7.4 Thickness of the compound	22
7.5 Switching contacts	26
7.6 External connections	27
7.7 Protection of bare live parts	28
7.8 Cells and batteries	28
7.9 Protective devices	32
8 Type tests	35
8.1 Tests on the compound	35
8.2 Tests on the apparatus	36
9 Routine verifications and tests	41
9.1 Visual inspections	41
9.2 Dielectric strength test	41
10 Marking	42

Annex A (informative) Basic requirements for compounds for “m” equipment

Annex B (informative) Allocation of test samples

Bibliography

PREFACE

This harmonized standard is based on IEC Publication 60079-18: 2014 edition, Explosive Atmospheres - Part 18: Equipment Protection by Encapsulation "m" issued 12-2014. IEC publication [IEC 60079-18] is copyrighted by the IEC.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

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 national differences.

All national differences from the IEC text are included in the UL version of the standard. While the technical content is the same in UL's version, the format and presentation may differ.

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National Differences

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60079-18, Explosive Atmospheres – Part 18: Equipment Protection by Encapsulation “m”, copyright 2014, are indicated by notations (differences) and are presented in bold text using legislative text (strike-out and underline).

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

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

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

D2 – These are National Differences 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, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

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

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES – Part 18: Equipment protection by encapsulation “m”

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 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.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

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

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

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

Standard IEC 60079-18 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This fourth edition cancels and replaces the third edition of IEC 60079-18 (2009), and constitutes a technical revision.

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

This edition includes the following significant technical changes with respect to the previous edition:

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Definitions deleted and moved to IEC 60079-0	3	X		
Heading modified /added to clarify which requirements are additional requirements for “ma” level of protection only	4	X		
Thermal conductivity added	5.2		X	
Note added that it is not a requirement of this standard that conformity to the manufacturer's specification of the compound needs to be verified	5.3.2	X		
Clarification added	6.2.2	X		
Clarification added	7.1	X		
For the determination of the faults options added and clarification given	7.2		X	
Additional information included in Figure 1	7.4.1	X		
“Varnish and similar coatings are not considered to be solid insulation.” was added in this section and deleted in the definition on 3.8	7.4.2	X		
For rigid, multi-layer printed wiring boards with through connections additional standards added	7.4.3.1		X	
Protection against inadmissible temperatures and damage to the cells	7.8.3			C1
Electrical protective devices clarified and additional possibilities added	7.9.2		X	
Thermal protective devices clarified and additional possibilities added	7.9.3		X	
2/3 voltage limitation deleted	7.9.3		X	
Determination of the maximum temperature for “Da” fixed	8.2.2			C2
Stabilization of the temperature	8.2.2			C3
Thermal endurance to heat	8.2.3.1		X	
Temperature fixed as referenced service temperatures and tests given as alternatives	8.2.3.1.1		X	
For the dielectric strength test procedure alternative possibilities added	8.2.4.1		X	
Alternative test methods for the required pressure test for Group I and Group II electrical equipment added	8.2.6		X	
Sealing test for build-in protective devices	8.2.8		X	
For the dielectric strength test procedure alternative possibilities added	9.2		X	
Marking	10	X	X	

Explanation of the Types of Significant Changes:

A) Definitions

1. Minor and editorial changes:

- Clarification
- Decrease of technical requirements
- Minor technical change
- Editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

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2. Extension:

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

3. Major technical changes:

- Addition of technical options
- addition of technical requirements
- increase of technical requirements

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in item B) below.

Note These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

B) Information about the background of 'Major technical changes'

C1 Clause 7.8.3 modified and additional requirements added for cells or batteries

C2 The flexibility given in IEC 60079-0 is replaced by a min. requirement. For level of protection "ma" equipment, designed for EPL "Da" the maximum surface temperature shall be determined with the equipment mounted in accordance with the manufacturer's instructions, and surrounded on all available surfaces by dust with a layer thickness of at least 200 mm

C3 The increase of the temperature during the test can be a very slow process. The final temperature shall be considered to have been reached when the rate of rise of temperature does not exceed 1 K/24 h

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

FDIS	Report on voting
31/1152/FDIS	31/1168/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.

The list of all parts of IEC 60079 series, published under the general title *Explosive atmospheres*, can be found on the IEC website.

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

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

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EXPLOSIVE ATMOSPHERES – Part 18: Equipment protection by encapsulation “m”

1 Scope

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

This part of IEC 60079 standard gives the specific requirements for the construction, testing and marking of electrical equipment, parts of electrical equipment and Ex components with the type of protection encapsulation “m” intended for use in explosive gas atmospheres or explosive dust atmospheres.

This part standard applies only for encapsulated electrical equipment, encapsulated parts of electrical equipment and encapsulated Ex components (hereinafter always referred to as “m” equipment) where the rated voltage does not exceed 11 kV.

The application of electrical equipment in atmospheres, which may contain explosive gas as well as combustible dust simultaneously, may require additional protective measures.

This standard does not apply to dusts of explosives, which do not require atmospheric oxygen for combustion, or to pyrophoric substances.

This standard does not take account of any risk due to an emission of flammable or toxic gas from the dust.

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

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

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:

ASTM-11, Specification for Wire Cloth and Sieves for Testing Purposes

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

IEC 60079-7, *Explosive atmospheres — Part 7: Equipment protection by increased safety “e”*

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

IEC 60079-15, *Explosive atmospheres — Part 15: Equipment protection by type of protection “n”*

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

~~IEC 60079-31, Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosures "t"~~

~~IEC 60127 (all parts), Miniature fuses~~

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

~~IEC 60691, Thermal links – Requirements and application guide~~

~~IEC 60730-2-9, Automatic electrical controls for household and similar use – Part 2-9: Particular requirements for temperature sensing controls~~

~~IEC 60738-1, Thermistors – Directly heated positive temperature coefficient – Part 1: Generic specification~~

~~IEC 61140, Protection against electric shock – Common aspects for installation and equipment~~

~~IEC 61558-1, Safety of power transformers, power supplies, reactors, and similar products – Part 1: General requirements and tests~~

~~IEC 61558-2-6, Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers~~

~~IEC 62326-4-1, Printed boards – Part 4: Rigid multilayer printed boards with interlayer connections – Sectional specification – Section 1: Capability detail specification – Performance levels A, B and C~~

~~IPC-A-600, Acceptability of Printed Boards~~

~~IPC-6012, Qualification and Performance Specification for Rigid Printed Boards~~

~~ISA 60079-26, Explosive atmospheres – Part 26: Equipment for Use in Class 1, Zone 0 Hazardous (Classified) Locations~~

~~ISA 60079-31, Explosive atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure "t"~~

~~ANSI/UL 248 (all parts), Standard for low-voltage fuses~~

~~ANSI/UL 746B, Standard for polymeric materials – Long term property evaluations~~

~~ANSI/UL 796, Printed-Wiring Boards~~

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

~~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"~~