



UL 60079-7

STANDARD FOR SAFETY

Explosive atmospheres – Part 7:
Equipment protection by increased
safety "e"

[ULNORM.COM](https://www.ulnorm.com) : Click to view the full PDF of UL 60079-7 2021

[ULNORM.COM](https://www.ulnorm.com) : Click to view the full PDF of UL 60079-7 2021

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

Fifth Edition, Dated February 24, 2017

Summary of Topics

This revision of ANSI/UL 60079-7 dated June 3, 2021 is being issued to update the title page to reflect the reaffirmation of its ANSI approval and to update the membership list. No changes in requirements have been made.

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.

The requirements are substantially in accordance with Proposal(s) on this subject dated March 19, 2021.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 60079-7 2021

FEBRUARY 24, 2017
(Title Page Reprinted: June 3, 2021)



ANSI/UL 60079-7-2017 (R2021)

1

UL 60079-7

**Standard for Explosive Atmospheres – Part 7: Equipment Protection by
Increased Safety "e"**

First Edition – December, 2002
Second Edition – March, 2007
Third Edition – Not Printed
Fourth Edition – October, 2008

Fifth Edition

February 24, 2017

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through June 3, 2021.

The most recent designation of ANSI/UL 60079-7 as a Reaffirmed American National Standard (ANS) occurred on June 3, 2021. 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 UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

COPYRIGHT © 2021 UNDERWRITERS LABORATORIES INC.

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 60079-7 2021

CONTENTS

Preface (UL)	7
National Differences	9
FOREWORD	11
1 Scope	19
1DV.1 Modification of Clause 1, first paragraph to replace with the following:	19
1DV.2 Modification of Clause 1, eighth paragraph to replace with the following:	20
1DV.3 Addition of 1DV.3.1.....	20
2 Normative references	20
2DV Modification of Clause 2 references to replace with the following:	20
3 Terms and definitions.....	24
3DV Modification of Clause 3 to replace with the following:.....	24
3.13.1DV Modification of Clause 3.13.1, Note 1 to replace with the following:	26
3.13.2DV Modification of Clause 3.13.2, to Add Note 2 as follows:	26
3.19DV Modification of Clause 3.19, Note 1 to replace with the following:	27
4 Constructional requirements	28
4.1 Level of Protection	28
4.1DV Modification of Clause 4.1 to replace with the following:	28
4.2 Electrical connections	28
4.3 Clearances	36
4.3ADV.1 Addition of the following Clause 4.3ADV.1 after the fourth paragraph:.....	36
4.4 Creepage distances.....	37
4.4.1DV.1 Modification of Clause 4.4.1, third paragraph to replace with the following:	37
4.4.1DV.2 Modification of Clause 4.4.1, NOTE 1 to replace with the following:	37
4.4.1ADV.1 Addition of the following Clause 4.4.1ADV.1 after NOTE 2:	37
4.5 Printed wiring boards with conformal coating, Level of Protection “ec”.....	46
4.6 Solid electrical insulating materials.....	46
4.7 Windings.....	47
4.8 Temperature limitations	48
4.9 Wiring internal to equipment	50
4.10 Degrees of protection provided by enclosures	50
4.10.1DV Modification of Clause 4.10.1 to replace with the following	50
4.10.2DV Modification of Clause 4.10.2 to replace with the following:	51
4.11 Fasteners	52
4.11DV.1 Modification of Clause 4.1 to replace with the following:	52
4.12ADV.1 Addition of Clause 4.12ADV.1 as follows:	52
5 Supplementary requirements for specific electrical equipment	52
5.1 General	52
5.2 Electrical machines.....	52
5.3 Luminaires, hand lights, or caplights	62
5.4 Analog measuring instruments and instrument transformers	73
5.5 Transformers other than instrument transformers	75
5.6 Supplementary requirements for equipment incorporating cells and batteries	75
5.7 General purpose connection and junction boxes	84
5.8 Resistance heating equipment (other than trace heating systems).....	84
5.9 Supplementary requirements for fuses	88
5.10 Other electrical equipment.....	89
5.10DV Modification of Clause 5.10 to replace with the following:.....	89
6 Type verifications and type tests	89
6.1 Dielectric strength.....	89
6.2 Rotating electrical machines.....	90

6.3	Luminaires	92
6.4	Measuring instruments and instrument transformers	99
6.5	Transformers other than instrument transformers	100
6.6	Verification and tests for cells and batteries of Level of Protection "eb"	100
6.7	Verification and tests for cells and batteries of Level of Protection "ec"	103
6.8	General purpose connection and junction boxes	103
6.9	Resistance heating equipment.....	104
6.10	Terminal insulating material tests	104
7	Routine verifications and routine tests.....	106
7.1	Dielectric tests.....	106
7.2	Dielectric tests for batteries	106
7.3	Inter-turn overvoltage tests.....	106
8	Ex Component certificates	106
8.1	General	106
8.2	Terminals	106
9	Marking and instructions	107
9.1	General marking.....	107
9.1DV.1	Modification of Clause 9.1, first paragraph to replace with the following:.....	107
9.2	Ex Component enclosures	108
DV.1	Modification of Clause 9.2, first paragraph and NOTE to replace with the following:....	108
9.3	Instructions for use	109
9.4	Warning markings.....	110
10	Documentation.....	111
10DV	Modification of Clause 10 to replace with the following:	111

Annex A (normative) Temperature determination of electrical machines – Methods of test and of calculation

A.1	General.....	112
A.2	Determination of maximum service temperatures	112
A.2.1	Rotor temperature – normal operation.....	112
A.2.2	Winding temperature – normal operation.....	112
A.3	Determination of maximum surface temperatures.....	113
A.3.1	General	113
A.3.2	Locked rotor tests.....	113
A.4	Optional calculation of maximum surface temperature	114
A.4.1	General	114
A.4.2	Rotor temperature	114
A.4.3	Stator temperature	114
A.5	Determination of t_E time	114
A.6	Arduous starting conditions.....	115
A.7	Motors operated with a converter	115

Annex B (normative) Type tests for specific forms of resistance heating devices or resistance heating units (other than trace heater)

B.1	Resistance heating devices subjected to mechanical stresses.....	116
Annex B.1DV	Modification of Clause B.1 to replace with the following	116
B.2	Resistance heating devices or units intended for immersion	116
B.3	Resistance heating devices or units having hygroscopic insulating material.....	116
B.4	Verification of limiting temperature of resistance heating devices (other than trace heaters)	116
B.4.1	General	116
B.4.2	Safety devices.....	116
B.4.3	Resistance heating unit of stabilized design.....	117
B.4.4	Heating device with temperature self-limiting characteristic.....	117

Annex C (informative) Cage motors – Thermal protection in service**Annex D (informative) Resistance heating devices and units – Additional electrical protection**

D.1	Objective.....	119
D.2	Method of protection	119

Annex E (informative) Combinations of terminals and conductors for general purpose connection and junction boxes

E.1	General.....	120
E.2	Maximum dissipated power method.....	120
E.3	Defined arrangement method.....	120

Annex F (normative) Dimensions of copper conductors**Annex G (normative) Test procedure for T5 (only 8 W), T8, T10 and T12 lamps**

G.1	Asymmetric pulse test.....	123
	G.1.1 General.....	123
	G.1.2 Test procedure.....	123
G.2	Asymmetric power test.....	125
	G.2.1 General.....	125
	G.2.2 Test procedure.....	125

Annex H (normative) Alternative separation distances for Level of Protection “ec” equipment under controlled environments

H.1	General.....	129
	Annex H.1DV.1 Modification of Annex H1, second paragraph to add NOTE after first bullet item as follows:.....	129
H.2	Specific Conditions of Use.....	129
	Annex H.2DV Modification of Annex H2 to replace with the following:.....	129
H.3	Control of pollution access.....	130
H.4	Voltage limitation	130
H.5	Control of overvoltages and transient protection	130
H.6	Alternative separation distances	130

Annex I (informative) Application, installation, and testing considerations for Level of Protection “ec” asynchronous machines

I.1	Surface temperature.....	132
I.2	Starting.....	132
I.3	Rated voltage and surface discharges	133

Annex J (informative) Luminaires incorporating LEDs

J.1	LEDs for EPL Gb.....	134
J.2	LEDs for EPL Gc.....	134

Bibliography

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 60079-7 2021

Preface (UL)

This UL Standard is based on IEC Publication 60079-7: fifth edition Explosive atmospheres – Part 7: Equipment protection by increased safety "e". IEC publication 60079-7 is copyrighted by the IEC.

These materials are subject to copyright claims of IEC and UL. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of UL. All requests pertaining to the Explosive atmospheres – Part 7: Equipment protection by increased safety "e", UL 60079-7 Standard should be submitted to 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.

The following people served as members of STP 60079 and participated in the review of this standard:

NAME	COMPANY
*B. Zimmermann, Chair	R Stahl Inc.
*T. Adam	FM Approvals LLC
R. Allen	Honeywell Inc.
J. Anderson	Thermon Mfg Co
D. Ankele	UL LLC
P. Becker	nVent
S. Blais	Emerson/Appleton Group
K. Boegli	KBB Consulting
R. Brownlee	Pepperl + Fuchs Inc.
D. Burns	Shell P&T – Innovation / R&D
*J. Chambers	UL LLC
R. Chalmers	Industrial Scientific Corp.
*C. Coache	National Fire Protection Association
*M. Cole	Hubbell Canada LP
M. Coppler	LabTest Certification Inc
*R. Deadman	UL LLC
*K. Dhillon	LabTest Certification Inc
M. Dona	Beach Energy
T. Dubaniewicz	NIOSH
G. Edwards	Det-Tronics
M. Egloff	Montana Tech, University of Montana
M. Ehrmann	R Stahl Inc
D. El Tawy	Siemens Energy
*A. Engler	Det Norske Veritas DNV
M. Fillip	National Oilwell Varco
W. Fiske	Intertek
Z. Fosse	DEKRA Certification Inc
G. Gurinder	Gurinder Garcha Consulting
D. Grady	Talema Group
J. Hickie	Caterpillar Inc.
R. Holub	DuPont
E. Hong	Solar Turbines Inc.
D. Jang	National Research Council Canada

NAME	COMPANY
*B. Johnson	Thermon Mfg. Co.
R. Johnson	Source IEC
*P. Kelly	UL LLC
S. Kiddle	ABB Inc
*M. Kornitsky	FM Approvals LLC
S. Lambaz	Littelfuse Inc.
W. Lawrence	FM Approvals LLC
E. Leubner	Eaton's Crouse-Hinds Business
W. Lockhart	GE Gas Power
W. Lowers	WCL Corp.
*N. Ludlam	FM Approvals Ltd.
R. Martin	USCG
E. Massey	ABB Motors and Mechanical Inc.
W. McBride	CONAM Construction Co.
T. Michalski	Killark Electric Mfg. Co.
J. Miller	MSA Innovation LLC
B. Miller	Mettler-Toledo LLC
N. Minquez	Proyel Co
*O. Murphy	Honeywell Inc.
D. Nedorostek	Bureau of Safety & Environmental Enforcement (BSEE)
A. Page	Bud Page Consultant Inc.
R. Parks	National Instruments
L. Ricks	ExVeritas North America LLC
P. Rigling	Eaton Electric Ltd – MTL
*K. Robinson	Occupational Safety and Health Adm.
J. Ruggieri	General Machine Corp.
S. Sam	Tundra Oil & Gas
*J. Scheller	ABB Motor and Mechanical Inc.
P. Schimmoeller	CSA Group
*T. Schnaare	Rosemount Inc.
R. Seitz	ARTECH Engineering
S. Sharma	Lindsay Corp.
J. Silliman	3M
K. Singh	Ex Safet Services and Solutions
G. Sitnik	QPS America Inc.
J. Smith	SGS
G. Steinman	ABB Installation Products
*R. Teather	Det Norske Veritas Certification Inc.
L. Vlagea	General Monitors
D. Wechsler	American Chemistry Council
N. Wienhold	Rosemount Inc.
R. Wigg	E-x Solutions International Pty Ltd.
*K. Wolf	Intertek
T. Woods	Bently Nevada
R. Zalosh	Firexplo

* Non-voting member

National Differences

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60079-7, Explosive atmospheres – Part 7: Equipment protection by increased safety "e" copyright 2015 are indicated by notations (differences) and are presented within the body of the UL printed standard in bold text with legislative mark-ups (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.

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.

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 60079-7 2021

FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES – Part 7: Equipment protection by increased safety "e"

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.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

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

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

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.

International Standard IEC 60079-7 has been prepared by IEC Technical Committee 31: Equipment for explosive atmospheres.

This fifth edition cancels and replaces the fourth edition published in 2006, and constitutes a technical revision.

The requirements for Type of Protection "nA" have been relocated from IEC 60079-15. To assist the user of this document, the significant changes with respect to the previous edition are shown below in two separate tables, one showing the changes from IEC 60079-7, Edition 4 (2006) for "e" to IEC 60079-7, Edition 5 (2014) for "eb"; and the other showing the changes from IEC 60079-15, Edition 4 (2010) for "nA" to IEC 60079-7, Edition 5 (2014) for "ec".

The significance of the changes between IEC Standard, IEC 60079-7, Edition 5 (2014) (for "eb") and IEC 60079-7, Edition 4 (2006) (for "e") are as listed below:

for “e” to “eb”		Type		
Explanation of the significance of the changes	Clause	Minor and editorial changes	Extension	Major technical changes
Scope Clarification of applicability Notes added to address short circuits and short-term thermal excursions	1	X		
Clarification of resistance heating definitions	3.13	X		
Addition of terminal insulation material tests	4.2.2.4			C1
Soldered Connections	4.2.2.5 4.2.3.3			C2
Silver-Soldered connections	4.2.3.3	X		
Clarification of “duplicated” contacts	4.2.3.4a)	X		
External plug and socket connections for field wiring connection of batteries	4.2.4	X		
Clarification of conditions for the determination of maximum surface temperature	4.8.1 Table 3	X		
Maximum temperatures for insulated windings	Table 4	X		
Degrees of protection provided by enclosures	4.10.1		X	C3
Clarification of applicability	5.2.1	X		
Minimum air gap for motors	5.2.6	X		
Devices for limiting winding temperature protection	5.2.8.2 5.2.8.3		X	
Permanent magnet motors	5.2.9 6.2.4 9.3.4c)		X	
Added Tungsten-Halogen lamp	5.3.2.2 5.3.2.3 5.3.2.4		X	
Added spacings for < 10 W lamps	5.3.3		X	
Permission added for re-lamping outside of hazardous area	5.3.5.2.2		X	
Added bayonet lamps	5.3.5.4.2		X	
Added contact requirements for bayonet lamps	5.3.5.5		X	
Renaming of “Type” of cells and batteries	5.6.2	X		
Clarification of approaches for general purpose junctions boxes	5.7 6.9 Annex E	X		
Clarified temperature monitoring and control	5.8	X		
Clarification of testing of battery powered luminaires	6.3.1	X		
Clarification of impact tests	6.3.2.2	X		
Added abnormal tests for discharge lamps	6.3.4.1			C4
Added T5 8W	6.3.4.3 Table 16		X	
To maintain T4 temperature class, cathode power or ambient temperature reduced	6.3.4.3 Table 16			C5
Clarification of routine tests for terminal boxes	7.1	X		
Marking of “e” replaced by “eb”	9.1	See “Information about the background of Changes”		

for "e" to "eb"		Type		
Explanation of the significance of the changes	Clause	Minor and editorial changes	Extension	Major technical changes
Ex Component enclosures	9.2			C6
Highlight essential documentation for rotating electrical machines	10	X		
Temperature tests	Annex A		X	

The significance of the changes between IEC Standard, IEC 60079-7, Edition 5 (2015) (for "ec") and IEC 60079-15, Edition 4 (2010) (for "nA") are as listed below:

for "nA" to "ec"		Type		
Explanation of the significance of the changes	Clause	Minor and editorial changes	Extension	Major technical changes
Scope Clarification of applicability Notes added to address short circuits and short-term thermal excursions	1	X		
Clarification of resistance heating definitions	3.13	X		
Soldered Connections	4.2.2.5 4.2.3.3			C7
Silver-Soldered connections	4.2.3.3	X		
Evaluation of pluggable connections	4.2.3.5a)	X		
External plug and socket connections for field wiring connection	4.2.4	X		
Minimum separation distances for encapsulated or solid insulation replaced by requirements for solid insulating materials	4.3 4.4 4.5 Table 2	X		
Alternative separation distances for equipment under controlled environments	4.3 4.4 Annex H		X	
Thermal stability of solid insulating materials	4.6			C8
Clarification of conditions for the determination of maximum surface temperature	4.8.1 Table 3	X		
Maximum temperatures for insulated windings	Table 4	X		
Clarification of applicability	5.2.1	X		
Permanent magnet motors	5.2.9 6.2.4 9.3.4c)		X	
Clarified applicability to handlights and caplights	5.3	X		
Addition of permitted light sources	5.3.2 Annex J		X	
Added spacings for < 10 W & 100-200 W lamps	5.3.4		X	
Added LED as a light source	5.3.2.5 0		X	

for "nA" to "ec"		Type		
Explanation of the significance of the changes	Clause	Minor and editorial changes	Extension	Major technical changes
Clarified internal spacings for LED packages	0	X		
Added spacings for < 10 V lamps	5.3.5.3.2		X	
Clarification of temperature testing	5.3.7	X		
Renaming of "Type" of cells and batteries	5.6.1	X		
Clarification of approaches for general purpose junctions boxes	5.7 6.8 Annex E	X		
Clarified temperature monitoring and control	5.8	X		
Clarification of permitted fuses	5.9.1	X		
Clarification of testing of battery powered luminaires	6.3.1	X		
Addition of end-of-life tests	6.3.4.3.2 Table 16			C9
Dielectric tests based on industrial standards	7.1		X	
Clarification of routine tests for terminal boxes	7.1	X		
Marking of "nA" is replaced by "ec"	9.1	See "Information about the background of Changes"		
Ex Component enclosures	9.2			C10
Highlight essential documentation for rotating electrical machines	10	X		
Temperature tests	Annex A		X	
Alternative separation distances	Annex H	A1		

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version.

Explanations:

A) Definitions

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.

Extension

addition of technical options

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.

Major technical changes

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 clause 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 'Changes

Marking:

Former marking of "nA" has been replaced by marking "ec". Even if the other technical aspects on the product are unchanged and comply with the revised requirements, a change in the marking will be required.

Former marking of "e" has been replaced by marking "eb". Even if the other technical aspects on the product are unchanged and comply with the revised requirements, a change in the marking will be required.

A1

The text of Annex H for *Alternative separation distances for Level of Protection "ec" equipment under controlled environments* has been reorganized and clarified from Clause 13 of IEC 60079-15, Ed 4; to facilitate consistent application of the requirements. The title has been revised to remove "low power" as power is not relevant for insulation coordination in accordance with IEC 60664-1. Although a clarification, it is recognized that some existing equipment may not meet the clarified requirement.

C1

The terminal insulating materials are now subjected to the same tests as rail-mounted terminals as a failure of the material presents the same hazard.

C2

Although a clarification, it is recognized that some existing equipment will not meet the clarified requirement. The requirements for soldered connections were revised to specify that mechanical support of the connection was required in addition to the solder. It is not a requirement that the connection function electrically in the absence of the solder.

C3

Ingress protection requirements for Group I increased from IP20 to IP23 for consistency with the remainder of the document.

C4

Added abnormal tests for discharge lamps.

C5

Based on further research, maintaining temperature class T4, under conditions of end-of-life, requires either the cathode power or the ambient temperature be reduced.

C6

Requirements for Ex Component “e” enclosures introduced based on those for Ex Component “d” enclosures. Even if the other technical aspects on the product are unchanged and comply with the revised requirements, a change in the marking will be required.

C7

Although a clarification, it is recognized that some existing equipment may not meet the clarified requirement. The requirements for soldered connections were revised to specify that mechanical support of the connection was required in addition to the solder. It is not a requirement that the connection function electrically in the absence of the solder.

C8

Requirements added for the use of solid insulating materials within the limits of their thermal stability.

C9

Based on further research, requirements for T5 lamps added.

C10

Requirements for Ex Component “e” enclosures introduced based on those for Ex Component “d” enclosures. Even if the other technical aspects on the product are unchanged and comply with the revised requirements, a change in the marking will be required.

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

FDIS	Report on voting
31/1182/FDIS	31/1194/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 of 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 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.

A bilingual version of this publication may be issued at a later date.

ULNORM.COM : Click to view the full PDF of UL 60079-7 2021

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 60079-7 2021

EXPLOSIVE ATMOSPHERES – Part 7: Equipment protection by increased safety "e"

1 Scope

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

1DV.1.1 This part of IEC 60079 standard specifies the requirements for the design, construction, testing and marking of electrical equipment and Ex Components with type of protection increased safety "e" intended for use in explosive gas atmospheres.

Electrical equipment and Ex Components of type of protection increased safety "e" are either:

- a) Level of Protection "eb" (EPL "Mb" or "Gb"); or
- b) Level of Protection "ec" (EPL "Gc")

Level of Protection "eb" applies to equipment or Ex Components, including their connections, conductors, windings, lamps, and batteries; but not including semiconductors or electrolytic capacitors.

NOTE 1 The use of electronic components, such as semiconductors or electrolytic capacitors, is excluded from Level of Protection "eb" as expected malfunctions could result in excessive temperatures or arcs and sparks if the internal separation distances were not applied. It is not generally practical to maintain those separation distances and maintain the function of the electronic component.

Level of Protection "ec" applies to equipment or Ex Components, including their connections, conductors, windings, lamps, and batteries; and also including semiconductors and electrolytic capacitors.

NOTE 2 The use of electronic components, such as semiconductors or electrolytic capacitors, is permitted in Level of Protection "ec" as these are evaluated under both normal conditions and regular expected occurrences, and are not likely to result in excessive temperatures or arcs and sparks. As the requirements for separation distances are not applied to the internal construction, commercially available electronic components are generally suitable if the external separation distances comply.

The requirements of this standard apply to both Levels of Protection unless otherwise stated.

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

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

NOTE 3 Short circuit currents flowing through increased safety connections of mains circuits are not considered to create a significant risk of ignition of an explosive gas atmosphere due to movement of connections as a result of mechanical stresses created by the short circuit current. Normal industrial standards require that the effects of short time high currents on the security of connections be considered. The presence of the explosive gas atmosphere does not adversely affect the security of the connection.

NOTE 4 Any short term thermal excursions that occur as a result of electrical current excursions above normal rated currents, such as those that occur during the starting of motors, are not considered to create a significant risk of ignition of an explosive gas atmosphere due to the relatively short duration of the event and the convection that occurs during the event.

NOTE 5 High-voltage connections and associated wiring (above 1 kV) can be susceptible to increased partial discharge activity that could be a source of ignition. Increased spacings to earthed surfaces or other connections and provision of suitable high-voltage stress relief for the terminations are typically provided.

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

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

1DV.3 DR Addition of 1DV.3.1

Where references are made to other IEC 60079 standards, the referenced requirements found in these standards 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:

ANSI C78.1, Fluorescent Lamps – Rapid Start Types – Dimensional and Electrical Characteristics

ANSI C81.61, Electric Lamp Bases

ANSI C81.62, Lampholders for Bases

ANSI/NFPA 70, National Electrical Code® (NEC®)

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

IEC 60034-29, Rotating electrical machines – Part 29: Equivalent loading and superposition techniques – indirect loading to determine temperature rise

IEC 60044-6, Instrument transformers – Part 6: Requirements for protective current transformers for transient performance

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

IEC 60061-2, Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders

IEC 60064, Tungsten filament lamps for domestic and similar general lighting purposes – Performance requirements

IEC 60068-2-6, Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)

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

IEC 60068-2-42, Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections

~~IEC 60079-0, 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 60079-30-1, Explosive atmospheres – Part 30-1: Electrical resistance trace heating – General and testing requirements~~

IEC/IEEE 60079-30-1, Explosive atmospheres – Part 30-1: Electrical resistance trace heating – General and testing requirements

IEC 60081, Double-Capped Fluorescent Lamps – Performance Specification

IEC 60085, Electrical insulation – Thermal evaluation and designation

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

IEC 60216-1, Electrical insulating materials – Thermal endurance properties – 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 60228, Conductors of insulated cables~~

IEC 60238, Edison screw lampholders

IEC 60317-3:2004, Specifications for particular types of winding wires – Part 3: Polyester enamelled round copper wire, class 155

IEC 60317-3:2004/AMD1:2010

IEC 60317-8, Specifications for particular types of winding wires – Part 8: Polyesterimide enamelled round copper wire, class 180

IEC 60317-13, Specifications for particular types of winding wires – Part 13: Polyester or polyesterimide overcoated with polyamide-imide enamelled round copper wire, class 200

IEC 60317-46, Specifications for particular types of winding wires – Part 46: Aromatic polyimide enamelled round copper wire, class 240

IEC 60400, Lampholders for tubular fluorescent lamps and starterholders

IEC 60432-1, Incandescent lamps – Safety specifications – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes

IEC 60432-2, Incandescent lamps – Safety specifications – Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes

IEC 60432-3, Incandescent lamps – Safety specifications – Part 3: Tungsten halogen lamps (non-vehicle)

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

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

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

~~**IEC 60947-1, Low-voltage switchgear and controlgear – Part 1: General rules**~~

~~**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 60947-7-4, XLow-voltage switchgear and controlgear – Part 7-4: Ancillary equipment – PCB 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 61184, Bayonet lampholders

IEC 61195, Double-capped fluorescent lamps – Safety specifications

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

IEC 61347-2-3, Lamp control gear – Part 2-3: Particular requirements for a. c. and/or d. c. supplied electronic control gear for fluorescent lamps

IEC 62035, Discharge lamps (excluding fluorescent lamps) – Safety specifications

ISO 2859-1, Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

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

ISO 178, Plastics – Determination of flexural properties

UL 486E Equipment Wiring Terminal for Use with Aluminum and/or Copper Conductors

UL 508 Industrial Control Equipment

UL 746A Polymeric Materials – Short Term Property Evaluations

UL 746B Polymeric Materials – Long Term Property Evaluations

UL 840 Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment

UL 844 Luminaires for Use in Hazardous (Classified) Locations

UL 1059 Terminal Blocks

UL 1598 Luminaires

UL 2238 Cable Assemblies and Fittings for Industrial Control and Signal Distribution

UL 2237 Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery

UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products

UL 60079-0 Explosive Atmospheres Part 0: Equipment – 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"

UL 60079-15 Explosive Atmospheres – Part 15: Construction, Test and Marking of Type of Protection "n" Electrical Apparatus

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

UL 60947-7-1 Low Voltage Switchgear and Controlgear – Part 7-1: Ancillary Equipment – Terminal Blocks for Copper Conductors

UL 60947-7-2 Low Voltage Switchgear and Controlgear – Part 7-2: Ancillary Equipment – Protective Conductors Terminal Blocks for Copper Conductors

UL 60947-7-4 Low Voltage Switchgear and Controlgear – Part 7-4: Ancillary Equipment – PCB Terminal Blocks for Copper Conductors

3 Terms and definitions

3DV DR Modification of Clause 3 to replace with the following:

For the purposes of this document standard, the terms and definitions given in ~~IEC 60079-0~~ UL 60079-0, as well as the following apply.

NOTE For the definitions of any other terms, particularly those of a more general nature, please refer to IEC 60050-426 or other appropriate parts of IEC 60050, *International Electrotechnical Vocabulary*.

3.1

cell and battery types

3.1.1

sealed cell

cell which remains closed and does not release either gas or liquid when operated within the limits specified by the manufacturer

Note 1 to entry: A sealed cell is often equipped with a safety device to protect against a dangerously high internal pressure and is designed to operate during its life in its original sealed state.

Note 2 to entry: A sealed cell was formerly known as a Type 1 cell in IEC 60079-15.

3.1.2

valve-regulated cell or battery

secondary cell or battery which is closed under normal conditions but which has an arrangement which allows the escape of gas if the internal pressure exceeds a predetermined value

Note 1 to entry: The cell cannot normally receive an addition to the electrolyte.

Note 2 to entry: A valve-regulated cell or battery was formerly known as a Type 2 cell in IEC 60079-15.

3.1.3

vented cell or battery

secondary cell or battery having a cover provided with an opening through which products of electrolysis and evaporation are allowed to escape freely from the cell or battery to the atmosphere

Note 1 to entry: A vented cell or battery was formerly known as a Type 3 cell in IEC 60079-15.

3.2

duty type (motor)

continuous, short-time or periodic duty, comprising one or more loads remaining constant for the duration specified, or a non-periodic duty in which generally load and speed vary within the permissible operating range

Note 1 to entry: These include duty types S1 to S10, as defined in IEC 60034-1.

3.3

ferrule

metal tube crimped over stranded wire to secure it within a terminal usually with electrical insulation protecting any exposed portion of the wire not completely inside the terminal post