

Plahvatusohtlikud keskkonnad. Osa 15: Kaitseviis “n”

Explosive atmospheres - Part 15: Equipment protection by type of protection "n"

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60079-15:2010 sisaldab Euroopa standardi EN 60079-15:2010 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.08.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 21.05.2010.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60079-15:2010 consists of the English text of the European standard EN 60079-15:2010.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.08.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 21.05.2010.

The standard is available from Estonian standardisation organisation.

ICS 29.260.20

Standardite reprodutseerimis- ja levitamisoigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

English version

**Explosive atmospheres -
Part 15: Equipment protection by type of protection "n"
(IEC 60079-15:2010)**

Atmosphères explosives -
Partie 15: Protection du matériel
par mode de protection "n"
(CEI 60079-15:2010)

Explosionsfähige Atmosphäre -
Teil 15: Geräteschutz
durch Zündschutzart "n"
(IEC 60079-15:2010)

This European Standard was approved by CENELEC on 2010-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 31/833/FDIS, future edition 4 of IEC 60079-15, prepared by IEC TC 31, Equipment for explosive atmospheres, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60079-15 on 2010-05-01.

This European Standard supersedes EN 60079-15:2005.

The significant technical changes with respect to EN 60079-15:2005 are as follows:

- addition of equipment protection levels;
- removal of the requirements for energy-limited “nL” and associated energy limited apparatus “[nL]”;
- removal of the requirements for encapsulated Devices “nC”;
- requirements for electrical connections expanded and clarified;
- requirements for luminaire ballasts expanded and clarified;
- requirements for evaluation and testing of motor rotors clarified;
- 15 kV limit for equipment protection by type of protection “n” added;
- spacing requirement for voltages above 10 kV modified;
- requirements for restricted breathing enclosures modified;
- modification to requirements for motor rotors and stators;
- addition of Annex A (informative);
- undated references to IEC 60079-0 included.

This standard is to be used in conjunction with EN 60079-0.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2011-02-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2013-05-01 |

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 94/9/EC. See Annex ZZ.

Annexes ZA, ZY and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60079-15:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60034-5	NOTE	Harmonized as EN 60034-5.
IEC/TS 60034-17	NOTE	Harmonized as CLC/TS 60034-17.
IEC 60068-2-6	NOTE	Harmonized as EN 60068-2-6.
IEC 60079-7:2006	NOTE	Harmonized as EN 60079-7:2007 (not modified).
IEC 60079-17	NOTE	Harmonized as EN 60079-17.
IEC 60079-18	NOTE	Harmonized as EN 60079-18.
IEC 60079-29-2	NOTE	Harmonized as EN 60079-29-2.
IEC 60297 series	NOTE	Harmonized in EN 60297 series (not modified).

This document is a preview generated by EVS

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034	Series	Rotating electrical machines	EN 60034	Series
IEC 60034-1	-	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1	-
IEC/TS 60034-25	-	Rotating electrical machines - Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply	CLC/TS 60034-25	-
IEC 60061	Series	Lamp caps and holders together with gauges for the control of interchangeability and safety	-	-
IEC 60061-1	-	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 1: Lamp caps	EN 60061-1	-
IEC 60068-2-27	2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	2009
IEC 60079-0	2007	Explosive atmospheres - Part 0: Equipment - General requirements	EN 60079-0	2009
IEC 60079-1	-	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"	EN 60079-1	-
IEC 60079-11	-	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"	EN 60079-11	-
IEC 60112	-	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	-
IEC 60155	-	Glow-starters for fluorescent lamps	EN 60155	-
IEC 60228	-	Conductors of insulated cables	EN 60228	-
IEC 60238	-	Edison screw lampholders	EN 60238	-
IEC 60269-3	-	Low-voltage fuses - Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications) - Examples of standardized systems of fuses A to F	HD 60269-3	-
IEC 60400	-	Lampholders for tubular fluorescent lamps and starterholders	EN 60400	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 60598	Series	Luminaires	EN 60598	Series
IEC 60598-1 (mod)	2008	Luminaires -	EN 60598-1	2008
-	-	Part 1: General requirements and tests	+ A11	2009
IEC 60598-2	Series	Luminaires -	EN 60598-2	Series
		Part 2: Particular requirements		
IEC 60664-1	-	Insulation coordination for equipment within low-voltage systems -	EN 60664-1	-
		Part 1: Principles, requirements and tests		
IEC 60927	-	Auxiliaries for lamps - Starting devices (other than glow starters) - Performance requirements	EN 60927	-
IEC 60947-7-1	-	Low-voltage switchgear and controlgear -	EN 60947-7-1	-
		Part 7-1: Ancillary equipment - Terminal blocks for copper conductors		
IEC 60947-7-2	-	Low-voltage switchgear and controlgear -	EN 60947-7-2	-
		Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors		
IEC 60998-2-4	-	Connecting devices for low voltage circuits for household and similar purposes -	EN 60998-2-4	-
		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 -	EN 60999-1	-
		Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm ² up to 35 mm ² (included)		
IEC 60999-2	-	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units -	EN 60999-2	-
		Part 2: Particular requirements for clamping units for conductors above 35 mm ² up to 300 mm ² (included)		
IEC 61048	-	Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements	EN 61048	-
IEC 61184	-	Bayonet lampholders	EN 61184	-
IEC 61195	-	Double-capped fluorescent lamps - Safety specifications	EN 61195	-
IEC 61347-1 (mod)	2007	Lamp controlgear -	EN 61347-1	2008
		Part 1: General and safety requirements		
IEC 61347-2-1	-	Lamp controlgear -	EN 61347-2-1	-
		Part 2-1: Particular requirements for starting devices (other than glow starters)		
IEC 61347-2-2	-	Lamp controlgear -	EN 61347-2-2	-
		Part 2-2: Particular requirements for d.c. or a.c. supplied electronic step-down convertors for filament lamps		
IEC 61347-2-3	-	Lamp controlgear -	EN 61347-2-3	-
		Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps		

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61347-2-4	-	Lamp controlgear - Part 2-4: Particular requirements for d.c. supplied electronic ballasts for general lighting	EN 61347-2-4	-
IEC 61347-2-7	-	Lamp controlgear - Part 2-7: Particular requirements for d.c. supplied electronic ballasts for emergency lighting	EN 61347-2-7	-
IEC 61347-2-8	-	Lamp controlgear - Part 2-8: Particular requirements for ballasts for fluorescent lamps	EN 61347-2-8	-
IEC 61347-2-9	-	Lamp controlgear - Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)	EN 61347-2-9	-

This document is a preview generated by EVS

Annex ZY (informative)

Significant changes between this European Standard and EN 60079-15:2005

This European Standard supersedes EN 60079-15:2005.

The significant changes with respect to EN 60079-15:2005 are as listed below.

	Type		
	Minor and editorial changes	Extension	Substantial change regarding ESR's ^a
Addition of Equipment Protection Levels		X	
Removal of the requirements for Energy-limited "nL" and associated energy limited apparatus "[nL]"		X	
Removal of the requirements for Encapsulated Devices "nC"		X	
Requirements for electrical connections expanded and clarified		X	
Requirements for luminaire ballasts expanded and clarified		X	
Requirements for evaluation and testing of motor rotors clarified	X		
15 kV limit for Equipment protection by type of protection "n" added		X	
Spacing requirement for voltages above 10 kV modified		X	
Requirements for restricted breathing enclosures modified		X	
Modification to requirements for motor rotors and stators		X	
Addition of Annex A (informative): Information on installation of nA machines to be considered for eventual inclusion into IEC 60079-14			
^a ESR = Essential Health and Safety Requirements (Annex II of Directive 94/9/EC)			

General conclusion on the change of the State of the Art by this standard

CENELEC/TC 31 as the responsible committee has concluded that this new edition does not contain substantial changes regarding the ESRs.

Annex ZZ (informative)

Coverage of essential requirements of the directive 94/9/EC

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers only the following essential safety requirements out of those given in Annex II of the EC Directive 94/9/EC:

ESR	Equivalent requirement in EN 60079-15:2005
1.0.1 dash 2	Definition 3.7 of EN 60079-15 and principles of the type of protection "n" for gas atmospheres
1.0.2	Definition 3.7 and Notes of EN 60079-15 and reference to EN 60079-0
1.0.3	Reference to EN 60079-0
1.0.4	Reference to EN 60079-0
1.0.5	Clause 24 of EN 60079-15 and reference to EN 60079-0
1.0.6	Clause 25 of EN 60079-15 and reference to EN 60079-0
1.1	Reference to EN 60079-0
1.2.1	Generally covered by EN 60079-15 and EN 60079-0
1.2.2	Reference to EN 60079-0
1.2.3	Not applicable. Release of flammable material is not foreseen
1.2.4	Not applicable. Dust atmospheres and deposits are out of scope
1.2.5	Reference to EN 60079-0
1.2.6	Warning label deemed adequate for Category 3 Equipment
1.2.7	Reference to EN 60079-0 and relevant standards for normal industrial applications.
1.2.8	Not specifically applied to Category 3 Equipment but covered in general for normal conditions by the installation requirements in EN 60079-14
1.2.9	Clause 17 of EN 60079-15
1.3.1	Principle of the type of protection "n" as far as applicable and reference to EN 60079-0
1.3.2	Reference to EN 60079-0
1.3.3	Reference to EN 60079-0
1.3.4	Clauses 8.7 of EN 60079-15 and reference to EN 60079-0
1.3.5	Not applicable to electrical equipment
1.4	Reference to EN 60079-0
1.5.1	Clause 12 in respect of charging of batteries
1.5.2 to 1.5.8	Not applicable
1.6.1 to 1.6.3	Not applicable
1.6.4	Reference to EN 60079-0
1.6.5	Not applicable

ESR	Equivalent requirement in EN 60079-15:2005
2.0, 2.1 and 2.2	Not applicable – out of scope
2.3.1	Fundamental basis of EN 60079-15 and references to EN 60079-0
2.3.2	Not applicable – out of scope
3	Not applicable – out of scope

This document is a preview generated by EVS

CONTENTS

FOREWORD.....	8
1 Scope.....	10
2 Normative references	14
3 Terms and definitions	15
4 General	17
4.1 Equipment grouping and temperature classification	17
4.2 Potential ignition sources	17
5 Temperatures	17
5.1 Maximum surface temperature	17
5.2 Small components	18
6 Requirements for electrical equipment.....	18
6.1 General.....	18
6.2 Opening times	18
6.3 Minimum degree of protection	18
6.3.1 General	18
6.3.2 Degree of protection provided by installation	18
6.4 Clearances, creepage distances and separations	18
6.4.1 General	18
6.4.2 Determination of working voltage	19
6.4.3 Conformal coating	19
6.4.4 Comparative tracking index (CTI)	19
6.4.5 Measurement of creepage and clearance	19
6.4.6 Compound filled cable sealing boxes	21
6.5 Electric strength	26
6.5.1 Insulation from earth or frame.....	26
6.5.2 Insulation between conductive parts	26
7 Connection facilities and terminal compartments	27
7.1 General.....	27
7.2 Field wiring connections	27
7.2.1 General	27
7.2.2 Connections made using terminals complying with IEC 60947-7-1, IEC 60947-7-2, IEC 60999-1, or IEC 60999-2	28
7.2.3 Field wiring connection facilities integral to “n” equipment or components	28
7.2.4 Connections designed to be used with cable lugs and similar devices	28
7.2.5 Connections using permanent arrangements	28
7.3 Factory connections	28
7.3.1 General	28
7.3.2 Field wiring connection methods used for factory connections	28
7.3.3 Other factory connections	28
7.3.4 Permanent connections	28
7.3.5 Pluggable connections.....	29
7.3.6 Terminal bridging connections	29
8 Supplementary requirements for non-sparking electrical machines	29
8.1 General.....	29
8.2 Machine enclosure	30

8.3	Terminal boxes.....	30
8.4	Conduit stopping boxes, cable sealing and dividing boxes.....	30
8.5	Connection facilities for external conductors.....	30
8.6	Neutral point connections.....	30
8.7	Radial air gap.....	31
8.8	Rotor cages.....	31
8.8.1	Rotor cages built from bars connected to end rings	31
8.8.2	Cast rotor cages	31
8.8.3	Assessment for possible air gap sparking	31
8.9	Stator winding insulation system	32
8.10	Surface temperature limitation.....	33
8.10.1	Prevention of thermal ignition	33
8.10.2	Operation with a frequency convertor or a non-sinusoidal supply.....	33
9	Supplementary requirements for non-sparking fuses and fuse assemblies.....	34
9.1	Fuses	34
9.2	Temperature class of equipment.....	34
9.3	Fuse mounting	34
9.4	Fuse enclosures	34
9.5	Replacement fuse identification.....	34
10	Supplementary requirements for non-sparking plugs and sockets.....	34
10.1	Plugs and sockets for external connections	34
10.2	Maintaining degree of protection (IP code)	35
10.3	Sockets that do not have plugs inserted in normal operation	35
11	Supplementary requirements for non-sparking luminaires.....	35
11.1	General.....	35
11.2	Construction.....	35
11.2.1	General	35
11.2.2	Enclosure of lamp.....	36
11.2.3	Lampholders.....	36
11.2.4	Auxiliaries.....	37
11.2.5	Creepage distances and clearances	38
11.2.6	Terminals	39
11.2.7	Internal wiring.....	39
11.3	Luminaires for tubular fluorescent bi-pin lamps.....	39
11.3.1	General	39
11.3.2	Maximum ambient temperature.....	39
11.3.3	Temperature class.....	39
11.3.4	Endurance tests and thermal tests.....	40
11.3.5	Resistance to dust and moisture.....	41
11.3.6	Insulation resistance and electric strength	41
11.4	Other equipment containing light sources	41
12	Supplementary requirements for equipment incorporating non-sparking cells and batteries.....	41
12.1	General.....	41
12.2	Categorization of cells and batteries.....	41
12.2.1	Type 1 cells and batteries.....	41
12.2.2	Type 2 cells and batteries.....	42
12.2.3	Type 3 cells and batteries.....	42

12.3	General requirements for cells and batteries of types 1 and 2	43
12.3.1	General	43
12.3.2	Maximum capacity	43
12.3.3	Secondary cells	43
12.3.4	Cell connection	43
12.3.5	Discharge mode	43
12.3.6	Temperature	43
12.3.7	Creepage and clearance	43
12.3.8	Connections	43
12.3.9	Connecting cells in series	43
12.3.10	Deep discharge protection	43
12.3.11	Temperature test conditions	44
12.3.12	Battery packs	44
12.3.13	Battery pack connections	44
12.3.14	Cell electrolyte and gas release	44
12.3.15	Excessive load draw	44
12.4	Charging of type 1 and type 2 cells and batteries	44
12.4.1	Temperature range	44
12.4.2	Charger specifications	44
12.4.3	Charging separated cells or batteries	44
12.4.4	Charger limitations	44
12.4.5	Charging outside the hazardous area	44
12.4.6	Gassing during charging of type 2 cells or batteries	45
12.5	Requirements for type 3 secondary batteries	45
12.5.1	Types of permissible batteries	45
12.5.2	Battery containers	45
12.5.3	Cells	46
12.5.4	Connections	47
12.6	Verification and tests	47
12.6.1	Insulation resistance	47
12.6.2	Mechanical shock test	47
13	Supplementary requirements for non-sparking low power equipment	47
14	Supplementary requirements for non-sparking current transformers	49
15	Other non-sparking electrical equipment	49
16	General supplementary requirements for equipment producing arcs, sparks or hot surfaces	49
17	Supplementary requirements for enclosed-break devices and non-incendive components producing arcs, sparks or hot surfaces	49
17.1	Type testing	49
17.2	Ratings	49
17.2.1	Enclosed-break devices	49
17.2.2	Non-incendive components	50
17.3	Construction of enclosed-break devices	50
17.3.1	Free internal volume	50
17.3.2	Continuous operating temperature (COT) requirements	50
17.3.3	Seal protection	50
18	Supplementary requirements for hermetically sealed devices producing arcs, sparks or hot surfaces	50

19	Supplementary requirements for sealed devices producing arcs, sparks or hot surfaces	50
19.1	Non-metallic materials	50
19.2	Opening	50
19.3	Internal spaces	50
19.4	Handling	51
19.5	Gasket and seals	51
19.6	Type tests	51
20	Supplementary requirements for restricted-breathing enclosures protecting equipment producing arcs, sparks or hot surfaces	51
20.1	General	51
20.2	Constructional requirements	51
20.2.1	Type of equipment	51
20.2.2	Cable glands and conduit entries	52
20.2.3	Operating rods, spindles and shafts	52
20.2.4	Windows	52
20.2.5	Gasket and seal requirements	53
20.2.6	Non-resilient seals	53
20.2.7	Test port	53
20.2.8	Internal fans	54
20.2.9	Routine test exemptions	54
20.3	Temperature limitation	54
20.3.1	General	54
20.3.2	Temperature calculation	54
20.4	Additional requirements for restricted breathing luminaires	55
20.4.1	Mounting arrangement	55
20.4.2	Reflectors	55
20.4.3	Surface temperatures of restricted breathing luminaires	55
21	General information on verification and tests	55
22	Type tests	55
22.1	Representative samples	55
22.2	Test configuration	55
22.3	Tests for enclosures on which the type of protection depends	55
22.3.1	Thermal endurance tests	55
22.4	Tests for enclosed break devices and non incensive components	56
22.4.1	Preparation of enclosed-break device samples	56
22.4.2	Preparation of non-incensive component samples	56
22.4.3	Test conditions for enclosed-break devices and non-incensive components	56
22.5	Tests for sealed devices	57
22.5.1	Conditioning	57
22.5.2	Voltage test	57
22.5.3	Tests on devices with free space	57
22.5.4	Test for sealed devices for luminaires	58
22.6	Type test requirements for restricted-breathing enclosures	58
22.6.1	General	58
22.6.2	Test procedures	59
22.6.3	Alternative Type test for equipment where the nominal volume of the enclosure changes due to pressure	59

22.7	Test for screw lampholders.....	59
22.8	Test for starter holders for luminaires	60
22.9	Tests for electronic starters for tubular fluorescent lamps and for ignitors for high pressure sodium or metal halide lamps	60
22.9.1	General	60
22.9.2	Moisture resistance, insulation and electric strength test	60
22.9.3	Cut-out device test	60
22.9.4	Life test (failed lamp).....	61
22.10	Test for wiring of luminaires subject to high-voltage impulses from ignitors.....	61
22.11	Mechanical shock test for batteries	62
22.11.1	General	62
22.11.2	Test procedure	62
22.11.3	Evaluation criteria	62
22.12	Insulation resistance test for batteries	62
22.12.1	Test conditions	62
22.12.2	Evaluation criteria	63
22.13	Additional ignition tests for large or high-voltage machines	63
22.13.1	Test for cage rotor construction	63
22.13.2	Test for stator winding insulation system incendivity.....	63
23	Routine verifications and tests.....	64
23.1	General	64
23.2	Specific routine tests	64
23.2.1	Electric strength test.....	64
23.2.2	Alternate dielectric strength test.....	64
23.2.3	Routine test requirements for restricted-breathing enclosures	64
23.2.4	Routine tests for electronic starters and ignitors	65
24	Marking	66
24.1	General	66
24.2	Where IP marking is required equipment shall be marked in accordance with 6.3. Additional marking for batteries	66
24.3	Examples of marking	67
24.3.1	Warning markings.....	67
25	Documentation	68
26	Instructions.....	68
	Annex A (informative) Application, installation, and testing considerations for Ex “nA” asynchronous machines.....	69
	Bibliography.....	71
	Figure 1 – Examples for determining clearances and creepage distances	26
	Table 1 – Relationship of this part to IEC 60079-0	10
	Table 2 – Minimum creepage distances, clearances and separations.....	20
	Table 3 – Tracking resistance of insulating materials	21
	Table 4 – Separation in compound-filled cable sealing boxes	22
	Table 5 – Assumed voltage of neutral points.....	30
	Table 6 – Potential air gap sparking risk assessment for cage rotor ignition risk factors.....	32
	Table 7 – Minimum distance between lamp and protective cover	36

Table 8 – Creepage distances and clearances at peak values of pulse voltages greater than 1,5 kV	39
Table 9 – Types and use of cells and batteries	42
Table 10 – Minimum creepage distances, clearances and separations for low power equipment.....	48
Table 11 – Insertion torque	59
Table 12 – Minimum removal torque	60
Table 13 – Explosion test mixtures	64
Table 14 – Text of warning markings	67

This document is a preview generated by EVS

EXPLOSIVE ATMOSPHERES –

Part 15: Equipment protection by type of protection "n"

1 Scope

This part of IEC 60079 specifies requirements for the construction, testing and marking for Group II electrical equipment with type of protection, "n" intended for use in explosive gas atmospheres. This standard applies to electrical equipment where the rated voltage does not exceed 15 kV r.m.s. a.c. or d.c.

This part of IEC 60079 is applicable to non-sparking electrical equipment and also to electrical equipment with parts or circuits producing arcs or sparks or having hot surfaces which, if not protected in one of the ways specified in this standard, could be capable of igniting a surrounding explosive gas atmosphere. This standard describes several different methods by which this can be achieved which may be combined with other methods described in IEC 60079-0.

This standard supplements and modifies the general requirements of IEC 60079-0, except as indicated in Table 1. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirement of this standard takes precedence.

Table 1 – Relationship of this part to IEC 60079-0

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
4	4	Equipment grouping	Applies	Applies	Applies
4.1	4.1	Group I	Excluded	Excluded	Excluded
4.2	4.2	Group II	Applies	Applies	Applies
4.3	4.3	Group III	Excluded	Excluded	Excluded
4.4	4.4	Equipment for a particular explosive atmosphere	Applies	Applies	Applies
5.1	5.1	Environmental influences	Applies	Applies	Applies
5.1.1	5.1.1	Ambient temperature	Applies	Applies	Applies
5.1.2	5.1.2	External source of heating or cooling	Applies	Applies	Applies
5.2	5.2	Service temperature	Applies	Applies	Applies
5.3.1	5.3.1	Determination of maximum surface temperature	Applies	Applies	Applies
5.3.2.1	5.3.2.1	Group I electrical equipment	Excluded	Excluded	Excluded

¹ Under consideration.

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
5.3.2.2	5.3.2.2	Group II electrical equipment	Applies	Applies	Applies
5.3.2.3	5.3.2.3	Group III electrical equipment	Excluded	Excluded	Excluded
5.3.3	5.3.3	Small component temperature for Group I and Group II electrical equipment	Applies	Applies	Excluded
6.1	6.1	General	Applies	Applies	Applies
6.2	6.2	Mechanical strength	Applies	Applies	Applies
6.3	6.3	Opening times	Excluded	Excluded	Applies
6.4	6.4	Circulating currents	Applies	Applies	Applies
6.5	6.5	Gasket retention	Applies	Applies	Applies
6.6	6.6	Electromagnetic and ultrasonic radiating equipment	Applies	Applies	Applies
7.1.1	7.1.1	Applicability	Applies	Applies	Applies
7.1.2	7.1.2	Specification of materials	Applies	Applies	Applies
7.1.3	7.1.2.2	Plastic materials	Applies	Applies	Applies
7.1.4	7.1.2.3	Elastomeric materials	Applies	Applies	Applies
7.2	7.2	Thermal endurance	Applies	Applies	Applies
7.3	7.3	Resistance to light	Applies	Applies	Applies
7.4	7.4	Electrostatic charges on external non-metallic materials	Applies	Applies	Applies
7.5	9.1	Threaded holes	Applies	Applies	Applies
8.1.1	8.2	Group I	Excluded	Excluded	Excluded
8.1.2	8.3	Group II	Applies	Applies	Applies
8.1.3	8.4	Group III	Excluded	Excluded	Excluded
8.2	9.1	Threaded holes	Applies	Applies	Applies
9.1	9.1	General	Applies	Applies	Applies
9.2	9.2	Special fasteners	Excluded	Excluded	Excluded
9.3	9.3	Holes for special fasteners	Excluded	Excluded	Excluded
10	10	Interlocking devices	Excluded	Excluded	Excluded
11	11	Bushings	Applies	Applies	Applies
12	12	Materials used for cementing	Modified	Modified	Modified
13	13	Ex components	Applies	Applies	Applies
14	14	Connection facilities and termination compartments	Modified	Modified	Modified
15	15	Connection facilities for earthing and bonding conductors	Applies	Applies	Applies

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.01 (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
16	16	Entries into enclosures	Applies	Applies	Applies
17	17	Supplementary requirements for rotating electrical machines	Excluded	Modified	Excluded
18	18	Supplementary requirements for switchgear	Applies	Applies	Applies
19	19	Supplementary requirements for fuses	Modified	Modified	Modified
20	20	Supplementary requirements for plugs and sockets	Modified	Modified	Modified
21	21	Supplementary requirements for luminaires	Modified	Modified	Modified
22	22	Supplementary requirements for caplights and handlights	Applies	Applies	Applies
23	23	Equipment incorporating cells and batteries	Modified	Modified	Modified
24	24	Documentation	Applies	Applies	Applies
25	25	Compliance of prototype or sample with documents	Applies	Applies	Applies
26.1	26.1	General	Applies	Applies	Applies
26.2	26.2	Test configuration	Applies	Applies	Applies
26.3	26.3	Tests in explosive test mixtures	Applies	Applies	Applies
26.4	26.4	Tests of enclosures	Applies	Applies	Applies
26.4.1.1	26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	Applies	Applies	Applies
26.4.1.2.1	26.4.1.2.1	Group I electrical equipment	Excluded	Excluded	Excluded
26.4.1.2.2	26.4.1.2.2	Group II and Group III electrical equipment	Applies	Applies	Applies
26.4.2	26.4.2	Resistance to impact	Applies	Applies	Applies
26.4.3	26.4.3	Drop test	Applies	Applies	Applies
26.4.4	26.4.4	Acceptance criteria	Applies	Applies	Applies
26.4.5	26.4.5	Degree of protection by enclosure	Applies	Applies	Applies
26.5	26.5	Thermal tests	Applies	Applies	Applies
26.6	26.6	Torque test for bushings	Applies	Applies	Applies
26.7	26.7	Non-metallic enclosures or non-metallic parts of enclosures	Modified	Modified	Modified
26.8	26.8	Thermal endurance to heat	Modified	Modified	Modified

Clause of IEC 60079-0			IEC 60079-0 clause application to IEC 60079-15		
Ed. 5.0 (2007) (informative)	Ed. 6.0 ¹ (future edition) (informative)	Clause / Subclause title (normative)	Protected sparking nC	Non sparking nA	Restricted breathing nR
26.9	26.9	Thermal endurance to cold	Applies	Applies	Applies
26.10	26.10	Resistance to light	Applies	Applies	Applies
26.11	26.11	Resistance to chemical agents for Group I electrical equipment	Excluded	Excluded	Excluded
26.12	26.12	Earth continuity	Applies	Applies	Applies
26.13	26.13	Surface resistance test of parts of enclosures of non-metallic materials	Applies	Applies	Applies
26.14	-	Charging tests	Applies	Applies	Applies
26.15	26.14	Measurement of capacitance	Applies	Applies	Applies
27	27	Routine tests	Applies	Applies	Applies
28	28	Manufacturers responsibility	Applies	Applies	Applies
29	29	Marking	Applies	Applies	Applies
30	30	Instructions	Applies	Applies	Applies
Annex A	Annex A	Supplementary requirements for Ex cable glands	Applies	Applies	Applies
Annex B	Annex B	Requirements for Ex components	Applies	Applies	Applies
Annex C	Annex C	Example of rig for resistance to impact test	Applies	Applies	Applies
Annex D	Annex D	Introduction to an alternative risk assessment method encompassing "equipment protection levels" for Ex equipment	Applies	Applies	Applies
Applies : this requirement of IEC 60079-0 is applied without change. Excluded : this requirement of IEC 60079-0 does not apply. Modified : this requirement of IEC 60079-0 is modified as detailed in this standard.					

NOTE 1 The clause number in the above table is shown for information only. The applicable requirements of IEC 60079-0 are identified by the clause title which is normative. This document was written against the specific requirements of IEC 60079-0 (ed. 5.0). The clause numbers for the previous edition are shown for information only. This is to enable the General Requirements IEC 60079-0 (ed. 5.0) to be used where necessary with this part of IEC 60079. Where there were no requirements, indicated by "NR" or there is a conflict between requirements, the later edition requirements take precedence.

NOTE 2 A non-incendive component is limited in use to the particular circuit for which it has been shown to be non-ignition capable and, therefore, cannot be separately assessed as complying with this standard.

NOTE 3 Compliance with this standard does not imply any removal of, or lowering of the requirements of any other standard with which the electrical equipment complies.

NOTE 4 This part of IEC 60079 supplements, and may enhance, the requirements for equipment for normal industrial applications. Where compliance with other IEC standards is indicated, such as IEC 60034 for motors and IEC 60598-2 for luminaires, proving compliance to those standards is normally the responsibility of the manufacturer.

NOTE 5 Type of protection "n" provides Equipment Protection Level (EPL) Gc. For further information, see IEC 60079-0.

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 60034 (all parts), *Rotating electrical machines*

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

IEC/TS 60034-25, *Rotating electrical machines – Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply*

IEC 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety*

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

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

IEC 60079-0:2007, *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 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60228, *Conductors of insulated cables*

IEC 60238, *Edison screw lampholders*

IEC 60269-3, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Examples of standardized systems of fuses A to F*

IEC 60400, *Lampholders for tubular fluorescent lamps and starterholders*

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

IEC 60598 (all parts), *Luminaires*

IEC 60598-1:2008, *Luminaires – Part 1: General requirements and tests*

IEC 60598-2 (all parts), *Luminaires – Part 2: Particular requirements*

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

IEC 60927, *Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements*

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 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 61048, *Auxiliaries for lamps – Capacitors for use in tubular fluorescent and other discharge lamp circuits – General and safety requirements*

IEC 61184, *Bayonet lampholders*

IEC 61195, *Double-capped fluorescent lamps – Safety specifications*

IEC 61347-1:2007, *Lamp controlgear – Part 1: General and safety requirements*

IEC 61347-2-1, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*

IEC 61347-2-2, *Lamp controlgear – Part 2-2: Particular requirements for d.c. or a.c. supplied electronic step-down convertors for filament lamps*

IEC 61347-2-3, *Lamp controlgear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps*

IEC 61347-2-4, *Lamp controlgear – Part 2-4: Particular requirements for d.c. supplied electronic ballasts for general lighting*

IEC 61347-2-7, *Lamp controlgear – Part 2-7: Particular requirements for d.c. supplied electronic ballasts for emergency lighting*

IEC 61347-2-8, *Lamp controlgear – Part 2-8: Particular requirements for ballasts for fluorescent lamps*

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)*

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

cable sealing box

auxiliary enclosure provided specifically for the purpose of sealing the insulation of a cable (for example, oil insulated cable) where it is connected to an apparatus

The enclosure may also provide for the connection of separate cable tails to the cable

3.2

clearance

shortest distance in air between two conductive parts