BSI Standards Publication

Explosive atmospheres

Part 18: Equipment protection by encapsulation “m”

bsi.

National foreword

This British Standard is the UK implementation of EN 60079-18:2015+A1:2017, incorporating corrigendum July 2018. It is identical to IEC 60079-18:2014, incorporating amendment 1:2017. It supersedes BS EN 60079-18:2015, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment A1 is indicated by [A1] ⟨A1⟩.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum July 2018 is indicated in the text by [AC1] ⟨AC1⟩.

BSI, as a member of CENELEC, is obliged to publish EN 60079-18 as a British Standard. However, attention is drawn to the fact that the UK committee voted against its approval as a European Standard.

This was due to an internal inconsistency in clause 7.2.

Clause 7.2.1 states that faults are not taken into account for “mc”, whereas the last sentence of 7.2.4.2 specifies absolute requirements for “mc” to avoid faults, making the requirements for some “mc” circuits more arduous than the same circuit for “ma” or “mb”.

As this is not new text for this edition, it is assumed that in many cases this has been resolved by the manufacturer and certifier reading 7.2.1 and then assuming, for “mc” equipment, that there is no need to read further into 7.2, therefore ignoring 7.2.4.2.

As it is not possible to satisfy both 7.2.1 and 7.2.4.2 at the same time, it is the opinion of the UK committee that 7.2.4.2 is not intended to be observed for “mc” equipment, and they have requested that IEC issue a formal corrigendum to that effect.

It is believed that the “mc” column of Table 1 was erroneously copied from 60079-15 and the purpose changed. In 60079-15, the table referred to segregation under 0.4 mm of compound in an IP54 enclosure for Ex nA equipment. That is to say that a 0.4 mm layer of encapsulant was considered to be better than conformal coating in terms of environmental protection. It was not related to the ability of the encapsulation to withstand an internal fault. The table was not applied to Ex n encapsulation and therefore should not have been applied to Ex mc.

The UK participation in its preparation was entrusted to Technical Committee EXL/31, Equipment for explosive atmospheres.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2015.

Amendments/corrigenda issued since publication

Date	Text affected
31 January 2018	Implementation of IEC amendment 1:2017 with CENELEC endorsement A1:2017
31 August 2018	Implementation of IEC corrigendum July 2018

EUROPEAN STANDARD EN 60079-18:2015

NORME EUROPÉENNE

EUROPÄISCHE NORM

ICS 29.260.20

English Version

Explosive atmospheres – Part 18: Equipment protection by encapsulation “m” (IEC 60079-18:2014)

Atmosphères explosives – Partie 18: Protection du matériel par encapsulage “m” (IEC 60079-18:2014)

Explosionsgefährdete Bereiche – Teil 18: Geräteschutz durch Vergusskapselung “m” (IEC 60079-18:2014)

This European Standard was approved by CENELEC on 2015-01-15. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 60079-18:2015+A1:2017: E

European foreword

The text of document 31/1152/FDIS, future edition 4 of IEC 60079-18, prepared by IEC/TC 31 "Explosive atmospheres" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60079-18:2015.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-10-24
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-01-16

This document supersedes EN 60079-18:2009.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For the relationship with EU Directive see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 60079-18:2014 was approved by CENELEC as a European Standard without any modification.

IEC 60079-1 NOTE Harmonized as EN 60079-1.

IEC 60079-2 NOTE Harmonized as EN 60079-5.

IEC 60079-5 NOTE Harmonized as EN 60079-5.

IEC 60079-6 NOTE Harmonized as EN 60079-6.

IEC 60079-10-1 NOTE Harmonized as EN 60079-10-1.

IEC 60079-10-2 NOTE Harmonized as EN 60079-10-2.

IEC 60079-14 NOTE Harmonized as EN 60079-14.

IEC 60079-28 NOTE Harmonized as EN 60079-28.

IEC 60086-1 NOTE Harmonized as EN 60086-1.

IEC 60622 NOTE Harmonized as EN 60622.

IEC 60604-1 NOTE Harmonized as EN 60604-1.

IEC 60747-5-5 NOTE Harmonized as EN 60747-5-5.

IEC 61951-1 NOTE Harmonized as EN 61951-1.

IEC 61951-2 NOTE Harmonized as EN 61951-2.

ISO 13849-1 NOTE Harmonized as EN ISO 13849-1.

Foreword to amendment A1

The text of document 31/1323/FDIS, future IEC 60079-18:2014/A1, prepared by IEC/TC 31 "Explosive atmospheres" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60079-18:2015/A1:2017.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-06-28
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-09-28

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 60079-18:2014/A1:2017 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60079-0 (mod)	—	Explosive atmospheres — Part 0: Equipment — General requirements	EN 60079-0	—
			+A11	2013
IEC 60079-7	—	Explosive atmospheres — Part 7: Equipment protection by increased safety "e"	EN 60079-7	—
IEC 60079-11	—	Explosive atmospheres — Part 11: Equipment protection by intrinsic safety "i"	EN 60079-11	—
IEC 60079-15	—	Explosive atmospheres — Part 15: Equipment protection by type of protection "n"	EN 60079-15	—
IEC 60079-26	—	Explosive atmospheres — Part 26: Equipment with equipment protection level (EPL) Ga	EN 60079-26	—
IEC 60079-31	—	Explosive atmospheres — Part 31: Equipment dust ignition protection by enclosure "t"	EN 60079-31	—
IEC 60127	series	Miniature fuses — Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links	EN 60127	series
IEC 60243-1	—	Electric strength of insulating materials — Test methods — Part 1: Tests at power frequencies	EN 60243-1	—
IEC 60691	—	Thermal-links — Requirements and application guide	EN 60691	—
IEC 60730-2-9(mod)	—	Automatic electrical controls for household and similar use — Part 2-9: Particular requirements for temperature sensing controls	EN 60730-2-9 +AA	—
IEC 60738-1	—	Thermistors — Directly heated positive temperature coefficient — Part 1: Generic specification	EN 60738-1	—
IEC 61140	—	Protection against electric shock — Common aspects for installation and equipment	EN 61140	—

Publication	Year	Title	EN/HD	Year
IEC 61558-1	—	Safety of power transformers, power supplies, reactors and similar products — Part 1: General requirements and tests	EN 61558-1	—
			+EN 61558-1:2005/ corrigendum Aug. 2006	2006
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	EN 61558-2-6	—
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	EN 62326-4-1	—

Annex ZZ
(informative)

Relationship between this European standard and the essential requirements of 2014/34/EU [2014 OJ L96] aimed to be covered

This European standard has been prepared under a Commission's standardisation request M/BC/CEN/92/46 to provide one voluntary means of conforming to essential requirements of 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZZ.1 — Correspondence between this European standard and Annex II of Directive 2014/34/EU [2014 OJ L96]

Essential Requirements of 2014/34/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
1.0.1.	1 / 3 / 4	
1.0.2.	4 /6 / 7.1 / 7.2	
1.0.3.	—	
1.0.4.	5 / 6 / 7.1 - 7.4	
1.0.5.	10	
1.0.6.	—	
1.1.1.	5	
1.1.2.	5	
1.1.3.	5	
1.2.1.	—	
1.2.2.	—	
1.2.3.	—	
1.2.4.	6.2.1	
1.2.5.	—	
1.2.6.	—	
1.2.7.	—	
1.2.8.	7.9	
1.2.9.	—	
1.3.1.	4	Principle of the type of protection "m"
1.3.2.	—	
1.3.3.	4	Principle of the type of protection "m" as far as applicable
1.3.4.	4	Principle of the type of protection "m"
1.3.5.	—	

Essential Requirements of 2014/34/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
1.4.1.	4	Principle of the type of protection “m”
1.4.2.	4	Principle of the type of protection “m”
1.5.1	7.9	
1.5.2.	7.9	
1.5.3.	—	
1.5.4.	—	
1.5.5.	—	
1.5.6.	—	
1.5.7.	—	
1.5.8.	—	
1.6.1.	—	
1.6.2.	—	
1.6.3.	—	
1.6.4.	7.6	
1.6.5.	—	
2.0.1.1.	6.2 / 6.3 / 7.2 / 7.3 / 8.2.6	
2.0.1.2.	6.2 / 6.3 / 7.2 / 7.3 / 8.2.6	
2.0.1.3.	6.2 / 6.3 / 7.2 / 7.3 / 8.2.6	
2.0.1.4.	—	
2.0.2.1.	6.2 / 6.3 / 7.2 / 7.3 / 8.2.6	
2.0.2.2.	—	
2.0.2.3	6.2 / 7.3.2	
2.1.1.1.	7.2.1 / 7.3.2 / 8.2.6	
2.1.1.2.	6.2 / 6.3	
2.1.1.3.	—	
2.1.2.1.	7.2.1 / 7.3.1	
2.1.2.2.	4	Principle of the type of protection “m”
2.1.2.3.	6.2.1 / 6.3	
2.1.2.4.	—	
2.2.1.1.	7.2.1 / 7.3.2 / 7.4.1 / 8.2.6	
2.2.1.2.	6.2 / 6.3	
2.2.1.3.	—	
2.2.2.1	7.2.1 / 7.3.1	
2.2.2.2.	6.2 / 6.3	
2.2.2.3.	—	
2.2.2.4.	—	
2.3.1.1.	7.2	
2.3.1.2.	6.2.1 / 7.2	
2.3.2.1.	7.2	
2.3.2.2.	6.2.1 / 7.2	
2.3.2.3.	—	
3.0.1.	—	

Essential Requirements of 2014/34/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
3.0.2.	—	
3.0.3.	—	
3.0.4.	—	
3.1.1.	—	
3.1.2.	—	
3.1.3.	—	
3.1.4.	—	
3.1.5.	—	
3.1.6.	—	
3.1.7.	—	
3.1.8.	—	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

Contents

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.

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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 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:

		Type		
Explanation of the significance of the changes	Clause	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 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 reference 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.

2. 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.

3. 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 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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the 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 the base publication and its amendment 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

This part of IEC 60079 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 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.

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.

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 enclosure “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*