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COMMENTED VERSION

INTERNATIONAL STANDARD

Explosive atmospheres –
Part 18: Equipment protection by encapsulation "m"

ICS 29.260.20

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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EXPLOSIVE ATMOSPHERES –

Part 18: Equipment protection by encapsulation "m"

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
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.
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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.
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This commented version (CMV) of the official standard IEC 60079-18:2025 edition 5.0 allows the user to identify the changes made to the previous IEC 60079-18:2014+AMD1:2017 CSV edition 4.1. Furthermore, comments from IEC TC 31 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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

This fifth edition cancels and replaces the fourth edition published in 2014 and Amendment 1:2017. This 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*.

Users of this document are advised that interpretation sheets clarifying the interpretation of this document can be published. Interpretation sheets are available from the IEC webstore and can be found in the "history" tab of the page for each document.

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**
Specification has been extended for clarification. Curing conditions have been added	5.2b)			C1
Dielectric strength test according to ANSI/UL 746A has been added as alternative	5.3.2		X	
Restructure of Clause 6	6	X		
Deletion of the additional protective measures as they are given in IEC 60079-0	7.1	X		
For the Level of Protection "mc" faults need to be considered regarding the separation distances	7.2.1			C1
The NOTE was changed to an EXAMPLE for clarification of track failures	7.2.1	X		
Intermediate failure conditions for components are not considered	7.2.1	X		
Clarification made about faults	7.2.1	X		
Another possibility for the construction of transformer according to IEC 60079-7 EPL "eb" added	7.2.3		X	
Rating of component shall not be exceeded was added as clarification	7.5.1			C1
Additional enclosure changed to "arc chamber" housing	7.5.1, 7.5.2, 7.5.3	X		
Consideration of fault conditions has been added	7.5.2			C1
Additional requirements for "ma" Equipment deleted	Former 7.6.2	X		
NOTE 2 added for protection of bare live parts	7.7	X		
Note 1 and Note 2 have been changed to normative text for clarification	7.9.1	X		
Requirement regarding the thermal coupling moved from 7.9.3 to 7.9.1 as this is applicable for all temperature monitoring devices	7.9.1	X		
The surface temperature determination for EPL Da has been deleted, because this is given in IEC 60079-0	8.2.2	X		
Acceptance criteria for the Dielectric strength test aligned with the TC 31 Good Working Practice	8.2.4.2	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 It is recognized that the new requirements were, in many cases, already applied. The change is to ensure that they are uniformly and consistently applied.

The text of this International Standard is based on the following documents:

Draft	Report on voting
31/1858/FDIS	31/870/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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 Ex Equipment, parts of electrical Ex Equipment and Ex Components with the Type of Protection encapsulation "m" (hereinafter referred to as "m" Equipment) 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.~~

For Levels of Protection "mb" and "mc", this document applies where the rated voltage does not exceed 11 kV AC_{RMS} or DC.

For Level of Protection "ma", this document applies where the rated voltage does not exceed 1 kV AC_{RMS} or DC.

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

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 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, *Electric~~al~~ strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60691, *Thermal-links – Requirements and application guide*

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

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

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

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

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

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*

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

ANSI/UL 746A, *Polymeric Materials – Short Term Property Evaluations*

~~ANSI/UL 746B, *Standard for polymeric materials – Long Term Property Evaluations*~~

ANSI/UL 796, *Printed-Wiring Boards*

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

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

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Edition 5.0 2025-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Explosive atmospheres –
Part 18: Equipment protection by encapsulation "m"

Atmosphères explosives –
Partie 18: Protection de l’appareil par encapsulage "m"

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EXPLOSIVE ATMOSPHERES –

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Explanation of the types of significant changes:

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- withdrawn, or
- revised.

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 Ex Equipment, parts of electrical Ex Equipment and Ex Components with the Type of Protection encapsulation "m" (hereinafter referred to as "m" Equipment) intended for use in explosive gas atmospheres or explosive dust atmospheres.

For Levels of Protection "mb" and "mc", this document applies where the rated voltage does not exceed 11 kV AC_{RMS} or DC.

For Level of Protection "ma", this document applies where the rated voltage does not exceed 1 kV AC_{RMS} or DC.

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

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

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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 60127 (all parts), *Miniature fuses*

IEC 60243-1, *Electric 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 – Part 2-9: Particular requirements for temperature sensing controls*

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

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

IEC 61558-1, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

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*

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

ANSI/UL 746A, *Polymeric Materials – Short Term Property Evaluations*

ANSI/UL 796, *Printed-Wiring Boards*

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

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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ATMOSPHÈRES EXPLOSIVES –

Partie 18: Protection de l'appareil par encapsulage "m"

AVANT-PROPOS

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L'IEC 60079-18 a été établie par le comité d'études 31 de l'IEC: Équipements pour atmosphères explosives. Il s'agit d'une Norme internationale.

Cette cinquième édition annule et remplace la quatrième édition parue en 2014, ainsi que l'Amendement 1:2017. Cette édition constitue une révision technique.

Cette Norme internationale doit être utilisée conjointement avec l'IEC 60079-0, *Atmosphères explosives — Partie 0: Matériel – Exigences générales*.

Les utilisateurs du présent document sont informés que des fiches d'interprétation clarifiant l'interprétation de ce dernier peuvent être publiées. Ces fiches d'interprétation sont disponibles sur le webstore de l'IEC, dans l'onglet "History" de la page de chaque document.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

		Type		
Explication de l'importance des modifications	**Article/paragraphe**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Extension de la spécification à des fins de clarification. Ajout de conditions de durcissement	5.2b)			C1
Ajout, en tant que variante, de l'épreuve de rigidité diélectrique conformément à l'ANSI/UL 746A	5.3.2		X	
Restructuration de l'article 6	6	X		
Suppression des mesures de protection supplémentaires indiquées dans l'IEC 60079-0	7.1	X		
Pour le niveau de protection "mc", il est nécessaire de prendre en compte les défauts en ce qui concerne les distances de séparation	7.2.1			C1
Remplacement de la NOTE par un EXEMPLE pour clarifier les défaillances par cheminement	7.2.1	X		
Exclusion des conditions de défaillance intermédiaires pour les composants	7.2.1	X		
Clarification concernant les défauts	7.2.1	X		
Ajout d'une autre possibilité de construction du transformateur conformément à l'IEC 60079-7 EPL "eb"	7.2.3		X	
Ajout d'une clarification selon laquelle les caractéristiques assignées d'un composant ne doivent pas être dépassées	7.5.1			C1
Remplacement de "enveloppe supplémentaire" par "logement de la "chambre d'arc""	7.5.1, 7.5.2, 7.5.3	X		
Ajout de la prise en compte des conditions de défaut	7.5.2			C1
Suppression des exigences supplémentaires pour l'appareil "ma"	Ancien 7.6.2	X		
Ajout de la NOTE 2 pour la protection des parties actives nues	7.7	X		
Transformation de la Note 1 et de la Note 2 en texte normatif à des fins de clarification	7.9.1	X		
Déplacement de l'exigence relative au couplage thermique de 7.9.3 à 7.9.1, car elle s'applique à tous les dispositifs de surveillance de température	7.9.1	X		
Suppression de la détermination de la température de surface pour l'EPL Da car elle est donnée dans l'IEC 60079-0	8.2.2	X		
Alignement des critères d'acceptation pour l'épreuve de rigidité diélectrique sur les bonnes pratiques de travail du TC 31	8.2.4.2	X		

Explication des types de modifications importantes:

A) Définitions

1 Modifications mineures et rédactionnelles:

- Clarification
- Diminution des exigences techniques
- Modification technique mineure
- Corrections rédactionnelles

Ces modifications portent sur les exigences et sont de nature rédactionnelle ou technique mineure. Elles comprennent des modifications de formulation destinées à clarifier les exigences techniques sans apporter de modification technique ni réduire le niveau actuel de l'exigence.

2 Extension:

- Ajout d'options techniques

Ces modifications ajoutent de nouvelles exigences techniques ou modifient les exigences techniques existantes, de façon à fournir de nouvelles options, mais sans augmenter les niveaux d'exigences pour tout appareil qui était totalement conforme à la précédente norme. Par conséquent, ces modifications n'ont pas à être prises en compte dans le cas de produits conformes à l'édition précédente.

3 Modifications techniques majeures:

- Ajout d'exigences techniques
- Augmentation des exigences techniques

Ces modifications sont apportées aux exigences techniques (ajout, augmentation du niveau ou suppression) de telle façon qu'un produit conforme à la précédente édition n'a pas toujours la capacité de satisfaire aux exigences indiquées dans la dernière édition. Ces modifications sont à prendre en compte dans le cas de produits conformes à la précédente édition. L'élément B) ci-dessous fournit des informations supplémentaires sur ces modifications.

NOTE Ces modifications reflètent les connaissances technologiques actuelles. Cependant, il convient que ces modifications n'aient pas d'influence sur l'appareil déjà sur le marché.

B) Informations de base concernant les "modifications techniques majeures"

C1 Il est reconnu que les nouvelles exigences ont, dans de nombreux cas, déjà été appliquées. La modification vise à assurer qu'elles sont appliquées de manière uniforme et cohérente.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
31/1858/FDIS	31/1870/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 60079, publiées sous le titre général *Atmosphères explosives*, peut être consultée sur le site Web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

ATMOSPHÈRES EXPLOSIVES –

Partie 18: Protection de l’appareil par encapsulage "m"

1 Domaine d’application

La présente partie de l’IEC 60079 définit les exigences spécifiques à la construction, aux essais et au marquage de l’appareil Ex électrique, des parties de l’appareil Ex électrique et des composants Ex protégés par encapsulage "m" (ci-après désignés appareils "m") et destinés à une utilisation dans les atmosphères explosives gazeuses ou les atmosphères explosives de poussière.

Pour les niveaux de protection "mb" et "mc", le présent document s’applique lorsque la tension assignée ne dépasse pas 11 kV en courant alternatif efficace ou en courant continu.

Pour le niveau de protection "ma", le présent document s’applique lorsque la tension assignée ne dépasse pas 1 kV en courant alternatif efficace ou en courant continu.

Le présent document ne tient pas compte des dangers, quels qu’ils soient, résultant d’une émission de gaz inflammable ou toxique provenant de la poussière.

Le présent document complète et modifie les exigences générales de l’IEC 60079-0. Si une exigence du présent document est en conflit avec une exigence de l’IEC 60079-0, l’exigence du présent document prévaut.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu’ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l’édition citée s’applique. Pour les références non datées, la dernière édition du document de référence s’applique (y compris les éventuels amendements).

IEC 60079-0, *Atmosphères explosives — Partie 0: Matériel – Exigences générales*

IEC 60079-7, *Atmosphères explosives — Partie 7: Protection du matériel par sécurité augmentée "e"*

IEC 60079-11, *Atmosphères explosives — Partie 11: Protection de l’appareil par sécurité intrinsèque "i"*

IEC 60079-15, *Atmosphères explosives — Partie 15: Protection du matériel par mode de protection "n"*

IEC 60127 (toutes les parties), *Coupe-circuit miniatures*

IEC 60243-1, *Rigidité diélectrique des matériaux isolants — Méthodes d’essai — Partie 1: Essais aux fréquences industrielles*

IEC 60691, *Protecteurs thermiques — Exigences et guide d’application*

IEC 60730-2-9, *Dispositifs de commande électrique automatiques — Partie 2-9: Exigences particulières pour les dispositifs de commande thermosensibles*

IEC 60738-1, *Thermistances — Coefficient de température positif à chauffage direct — Partie 1: Spécification générique*

IEC 61140, *Protection contre les chocs électriques — Aspects communs aux installations et aux matériels*

IEC 61558-1, *Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et des combinaisons de ces éléments — Partie 1: Exigences générales et essais*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications (disponible en anglais seulement)*

IEC 62326-4-1, *Cartes imprimées — Partie 4: Cartes imprimées multicouches rigides avec connexions intercouches — Spécification intermédiaire — Section 1: Spécification particulière d'agrément — Niveaux de performances A, B et C*

ANSI/UL 248 *(toutes les parties)*, *Standard for low-voltage fuses* (disponible en anglais seulement)

ANSI/UL 746A, *Polymeric Materials – Short Term Property Evaluations* (disponible en anglais seulement)

ANSI/UL 796, *Printed-Wiring Boards* (disponible en anglais seulement)

IPC-A-600, *Acceptability of Printed Boards* (disponible en anglais seulement)

IPC-6012, *Qualification and Performance Specification for Rigid Printed Boards* (disponible en anglais seulement)