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INTERNATIONAL STANDARD

colour inside

Low-voltage fuses –
Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE FUSES –

Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices

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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9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This commented version (CMV) of the official standard IEC 60269-4:2024 edition 6.0 allows the user to identify the changes made to the previous IEC 60269-4:2009+AMD1:2012+AMD2:2016 CSV edition 5.2. Furthermore, comments from IEC SC 32B 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 60269-4 has been prepared by subcommittee 32B: Low-voltage fuses, of IEC technical committee 32: Fuses. It is an International Standard.

This sixth edition cancels and replaces the fifth edition published in 2009, Amendment 1:2012 and Amendment 2:2016. This edition constitutes a technical revision.

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

a) the introduction of voltage source inverter fuse-links, including test requirements.
b) coverage of the tests on operating characteristics for AC. by the breaking capacity tests.
c) the updating of examples of standardised fuse-links for the protection of semiconductor devices.

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

Draft	Report on voting
32B/746/FDIS	32B/753/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.

This part is to be used in conjunction with IEC 60269-1:2024, *Low-voltage fuses – Part 1: General requirements*.

This Part 4 supplements or modifies the corresponding clauses or subclauses of Part 1.

Where no change is necessary, this Part 4 indicates that the relevant clause or subclause applies.

Tables and figures which are additional to those in Part 1 are numbered starting from 101.

Additional annexes are lettered AA, BB, etc.

A list of all parts of the IEC 60269 series, under the general title: *Low-voltage fuses*, 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,
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IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

LOW-VOLTAGE FUSES –

Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices

1 ~~General~~ Scope 1

IEC 60269-1 applies with the following supplementary requirements.

Fuse-links for the protection of semiconductor devices shall comply with all requirements of IEC 60269-1, if not otherwise indicated hereinafter, and shall also comply with the supplementary requirements laid down below.

~~1.1 Scope and object~~

These supplementary requirements apply to fuse-links for application in equipment containing semiconductor devices for circuits of nominal voltages up to 1 000 V AC or 1 500 V DC~~ and also, in so far as they are applicable, for circuits of higher nominal voltages~~. For some fuse-links higher rated voltages can be used. 2

NOTE ~~1~~ Such fuse-links are commonly referred to as "semiconductor fuse-links".

~~NOTE 2 In most cases, a part of the associated equipment serves the purpose of a fuse-base. Owing to the great variety of equipment, no general rules can be given; the suitability of the associated equipment to serve as a fuse-base should be subject to agreement between the manufacturer and the user. However, if separate fuse-bases or fuse-holders are used, they should comply with the appropriate requirements of IEC 60269-1.~~

~~NOTE 3 IEC 60269-6 (Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems) is dedicated to the protection of solar photovoltaic energy systems.~~

~~NOTE 4 These fuse-links are intended for use on systems employing the standardized voltages and tolerances of IEC 60038. Tests carried out on fuse-links in accordance with previous editions of this standard shall remain valid until such time as complimentary equipment has evolved to the standardized voltages and tolerances of IEC 60038.~~ 3

The object of these supplementary requirements is to establish the characteristics of semiconductor fuse-links in such a way that they can be replaced by other fuse-links having the same characteristics, provided that their dimensions are identical. For this purpose, this standard refers in particular to

a) the following characteristics of fuses:
   1) their rated values
   2) their temperature rises in normal service
   3) their power dissipation
   4) their time-current characteristics
   5) their breaking capacity
   6) their cut-off current characteristics and their I^2t characteristics
   7) their arc voltage characteristics
b) type tests for verification of the characteristics of fuses
c) the markings on fuses
d) availability and presentation of technical data (see Annex BB).

2 Normative references 4

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 60269-1:2024, *Low-voltage fuses – Part 1: General requirements*

IEC 60269-2:2013, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to K*
IEC 60269-2:2013/AMD1:2016
IEC 60269-2:2013/AMD2:2024

~~IEC 60269-3, *Low-voltage fuses – 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 TR 60269-5:2014, *Low-voltage fuses – Part 5: Guidance for the application of low-voltage fuses*
IEC TR 60269-5:2014/AMD1:2020

~~IEC 60269-6, *Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems*~~

IEC 60417, *Graphical symbols for use on equipment*

~~IEC 60664-1:2000, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*~~

ISO 3, *Preferred numbers – Series of preferred numbers*

IEC 60269-4

Edition 6.0 2024-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Low-voltage fuses – Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices

Fusibles basse tension – Partie 4: Exigences supplémentaires concernant les éléments de remplacement utilisés pour la protection des dispositifs à semiconducteurs

IEC 60269-4:2024-08(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE FUSES –

Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices

1 Scope

IEC 60269-1 applies with the following supplementary requirements.

Fuse-links for the protection of semiconductor devices shall comply with all requirements of IEC 60269-1, if not otherwise indicated hereinafter, and shall also comply with the supplementary requirements laid down below.

These supplementary requirements apply to fuse-links for application in equipment containing semiconductor devices for circuits of nominal voltages up to 1 000 V AC or 1 500 V DC. For some fuse-links higher rated voltages can be used.

NOTE Such fuse-links are commonly referred to as "semiconductor fuse-links".

The object of these supplementary requirements is to establish the characteristics of semiconductor fuse-links in such a way that they can be replaced by other fuse-links having the same characteristics, provided that their dimensions are identical. For this purpose, this standard refers in particular to

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   1) their rated values
   2) their temperature rises in normal service
   3) their power dissipation
   4) their time-current characteristics
   5) their breaking capacity
   6) their cut-off current characteristics and their I^2t characteristics
   7) their arc voltage characteristics
b) type tests for verification of the characteristics of fuses
c) the markings on fuses
d) availability and presentation of technical data (see Annex BB).

2 Normative references

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IEC 60269-2:2013/AMD1:2016
IEC 60269-2:2013/AMD2:2024

IEC TR 60269-5:2014, *Low-voltage fuses – Part 5: Guidance for the application of low-voltage fuses*
IEC TR 60269-5:2014/AMD1:2020

IEC 60417, *Graphical symbols for use on equipment*

ISO 3, *Preferred numbers – Series of preferred numbers*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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FUSIBLES BASSE TENSION –

Partie 4: Exigences supplémentaires concernant les éléments de remplacement utilisés pour la protection des dispositifs à semiconducteurs

AVANT-PROPOS

1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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L'IEC 60269-4 a été établie par le sous-comité 32B: Coupe-circuits à fusibles à basse tension, du comité d'études 32 de l'IEC: Coupe-circuits à fusibles. Il s'agit d'une Norme internationale.

Cette sixième édition annule et remplace la cinquième édition parue en 2009, l'Amendement 1:2012 et l'Amendement 2:2016. Cette édition constitue une révision technique.

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

a) les éléments de remplacement pour onduleur à source de tension ont été ajoutés, y compris les exigences d'essai;
b) les essais des caractéristiques de fonctionnement en courant alternatif sont couverts par les essais du pouvoir de coupure;
c) les exemples d'éléments de remplacement normalisés pour la protection des dispositifs à semiconducteurs ont été mis à jour.

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

Projet	Rapport de vote
32B/746/FDIS	32B/753/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/standardsdev/publications.

La présente partie doit être utilisée conjointement avec l'IEC 60269-1:2024, *Fusibles basse tension – Partie 1: Exigences générales*.

La présente Partie 4 complète ou modifie les articles ou paragraphes correspondants de la Partie 1.

Lorsqu'aucune modification n'est nécessaire, la Partie 4 indique que l'article ou le paragraphe correspondant s'applique.

Les tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101.

Les annexes qui sont ajoutées sont désignées AA, BB, etc.

Une liste de toutes les parties de la série IEC 60269, publiées sous le titre général *Fusibles basse tension*, se trouve 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

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FUSIBLES BASSE TENSION –

Partie 4: Exigences supplémentaires concernant les éléments de remplacement utilisés pour la protection des dispositifs à semiconducteurs

1 Domaine d'application

L'IEC 60269-1 s'applique avec les exigences supplémentaires suivantes.

Sauf indication contraire dans le texte qui suit, les éléments de remplacement utilisés pour la protection des dispositifs à semiconducteurs doivent satisfaire à l'ensemble des exigences de l'IEC 60269-1 ainsi qu'aux exigences supplémentaires ci-après.

Les présentes exigences supplémentaires s'appliquent aux éléments de remplacement destinés à être associés à des matériels comportant des dispositifs à semiconducteurs et utilisés dans des circuits de tensions nominales inférieures ou égales à 1 000 V en courant alternatif ou à 1 500 V en courant continu. Pour certains éléments de remplacement, des tensions assignées supérieures peuvent être utilisées.

NOTE Ces éléments de remplacement sont couramment dénommés "éléments de remplacement pour semiconducteurs".

Les présentes exigences supplémentaires ont pour objet d'établir les caractéristiques des éléments de remplacement pour semiconducteurs de sorte qu'ils puissent être remplacés par d'autres éléments de remplacement de mêmes caractéristiques, sous réserve que leurs dimensions soient identiques. À cette fin, la présente norme traite en particulier:

a) des caractéristiques suivantes des fusibles:
   1) leurs valeurs assignées;
   2) leurs échauffements en service normal;
   3) leur puissance dissipée;
   4) leurs caractéristiques temps-courant;
   5) leur pouvoir de coupure;
   6) leurs caractéristiques de courant coupé limité et caractéristiques I^2t;
   7) leurs caractéristiques de tension d'arc;
b) les essais de type destinés à vérifier les caractéristiques des fusibles;
c) les marquages des fusibles;
d) la disponibilité et la présentation des données techniques (voir l'Annexe BB).

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 60269-1:2024, *Fusibles basse tension – Partie 1: Exigences générales*

IEC 60269-2:2013, *Fusibles basse tension – Partie 2: Exigences supplémentaires pour les fusibles destinés à être utilisés par des personnes habilitées (fusibles pour usages essentiellement industriels) – Exemples de systèmes de fusibles normalisés A à K*
IEC 60269-2:2013/AMD1:2016
IEC 60269-2:2013/AMD2:2024

IEC TR 60269-5:2014, *Fusibles basse tension – Partie 5: Lignes directrices pour l'application des fusibles basse tension*
IEC TR 60269-5:2014/AMD1:2020

IEC 60417, *Symboles graphiques à utiliser sur les équipements*

ISO 3, *Nombres normaux – Séries de nombres normaux*