

MADALPINGELISED SULAVKAITSMED. OSA 4:  
LISANÕUDED SULAVPANUSTELE POOLJUHTSEADMETE  
KAITSEKS

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

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>See Eesti standard EVS-EN IEC 60269-4:2025 sisaldab Euroopa standardi EN IEC 60269-4:2025 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 27.06.2025.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN IEC 60269-4:2025 consists of the English text of the European standard EN IEC 60269-4:2025.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 27.06.2025.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
--	---

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 29.120.50

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

ICS 29.120.50

Supersedes EN 60269-4:2009; EN 60269-4:2009/A1:2012; EN 60269-4:2009/A2:2016

English Version

## Low-voltage fuses - Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices (IEC 60269-4:2024)

Fusibles basse tension - Partie 4: Exigences supplémentaires concernant les éléments de remplacement utilisés pour la protection des dispositifs à semiconducteurs (IEC 60269-4:2024)

Niederspannungssicherungen - Teil 4: Zusätzliche Anforderungen an Sicherungseinsätze zum Schutz von Halbleiter-Bauelementen (IEC 60269-4:2024)

This European Standard was approved by CENELEC on 2024-10-16. 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.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

## European foreword

The text of document 32B/746/FDIS, future edition 6 of IEC 60269-4, prepared by SC 32B "Low-voltage fuses" of IEC/TC 32 "Fuses" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60269-4:2025.

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) 2026-06-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-06-30

This document supersedes EN 60269-4:2009 and all of its amendments and corrigenda (if any).

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

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

## Endorsement notice

The text of the International Standard IEC 60269-4:2024 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 standard indicated:

IEC 60269-6:2010	NOTE Approved as EN 60269-6:2011 (not modified)
IEC 60269-6:2010/A1:2021	NOTE Approved as EN 60269-6:2011/A1:2023 (not modified)
IEC 60269-7:2021	NOTE Approved as EN IEC 60269-7:2024 (not modified)
IEC 60664-1:2020	NOTE Approved as EN IEC 60664-1:2020 (not modified)

# 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**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

---

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Recherche de publications IEC -

##### [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

# 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**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 29.120.50

ISBN 978-2-8322-8933-4

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions.....	7
4 Conditions for operation in service.....	8
5 Classification.....	9
6 Characteristics of fuses.....	9
7 Markings.....	13
8 Standard conditions for construction.....	14
9 Tests.....	14
Annex AA (informative) Guidance for the coordination of fuse-links with semiconductor devices.....	26
Annex BB (normative) Survey on information to be supplied by the manufacturer in his literature (catalogue) or on request for a fuse designed for the protection of semiconductor devices.....	27
Annex CC (normative) Examples of standardized fuse-links for the protection of semiconductor devices.....	28
Bibliography.....	45
Figure 101 – Example of a conventional test arrangement for bolted fuse-links.....	24
Figure 102 – Example of a conventional test arrangement for blade contact fuse-links.....	25
Figure CC.1 – Single body fuse-links.....	29
Figure CC.2 – Double body fuse-links.....	30
Figure CC.3 – Twin body fuse-links.....	31
Figure CC.4 – Striker fuse-links.....	31
Figure CC.5 – Fuse-links with bolted connections, type B, body sizes 000 and 00.....	33
Figure CC.6 – Fuse-links with bolted connections, type B, body sizes 0, 1, 2 and 3.....	34
Figure CC.7 – Bolted fuse-links, type C.....	36
Figure CC.8 – Flush end fuse-links, type A.....	38
Figure CC.9 – Flush end fuse-links, type B.....	40
Figure CC.10 – Fuse-links with cylindrical contact caps, type A.....	41
Figure CC.11 – Fuse-links with cylindrical contact caps, type B.....	43
Figure CC.12 – Fuse-links with cylindrical contact caps with striker, type B (additional dimensions for all sizes except 10 × 38).....	44
Table 101 – Conventional time and current for "gR" and "gS" fuse-links.....	11
Table 102 – List of complete tests.....	15
Table 103 – Survey of tests on fuse-links of the smallest rated current of a homogeneous series.....	16
Table 107 – Cross-sectional area of copper conductors for high current ratings tests.....	17
Table 104 – Values for breaking-capacity tests on AC fuses.....	20
Table 105 – Values for breaking-capacity tests on DC fuses.....	21
Table 106 – Values for breaking-capacity tests on VSI fuse-links.....	21

Table CC.1 – Typical rated voltages and preferred maximum rated currents .....42

This document is a preview generated by EVS

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) 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.

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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

## 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

- 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

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 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*

### 3 Terms and definitions

IEC 60269-1 applies with the following supplementary definitions.

#### 3.2 General terms

##### 3.2.101

##### **semiconductor device**

device whose essential characteristics are due to the flow of charge carriers within a semiconductor.

[SOURCE: IEC 60050-521:2002, 521-04-01]

##### 3.2.102

##### **semiconductor fuse-link**

current-limiting fuse-link capable of breaking, under specific conditions, any current value within the breaking range (see 8.4)

##### 3.2.103

##### **signalling device**

device forming part of the fuse and signalling the fuse operation to a remote place

Note 1 to entry: A signalling device consists of a striker and an auxiliary switch. Electronic devices may also be used.

##### 3.2.104

##### **voltage source inverter**

##### **VSI**

a voltage stiff inverter

Note 1 to entry: Also referred to as a voltage stiff inverter i.e. an inverter that supplies current without any practical change in its output voltage.

[SOURCE: IEC 60050-551:1998, 551-12-11]

##### 3.2.105

##### **voltage source inverter fuse-link**

##### **VSI fuse-link**

current-limiting fuse-link capable of breaking, under specified conditions, the short circuit current supplied by the discharge of a DC-link capacitor in a voltage source inverter

Note 1 to entry: The abbreviation "VSI fuse-link" is used in this document.

Note 2 to entry: A VSI fuse-link usually operates under a short circuit current supplied by the discharge of a DC-link capacitor through a very low inductance, in order to allow high frequency in normal operation. This short circuit condition leads to a very high rate of rise of current equivalent to a very low value of time constant, typically 3 ms or less. The supply voltage is DC, even though the applied voltage decreases as the current increases during the short circuit.

Note 3 to entry: In some multiple AC drive applications, individual output inverters may be remote from the main input rectifier. In these cases, the associated fault circuit impedances may influence the operation of the fuse-links. – the associated time constant and the size of the capacitors need to be considered when choosing the appropriate short circuit protection.