



DPC: 24 / 30480616 DC

## BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 29 February 2024

Origin: International

---

**Latest date for receipt of comments: 17 April 2024**

Project No. 2023/02245

Responsible committee: PEL/32 Fuses

Interested committees:

---

Title: BS EN IEC 63523 High-Voltage DC Fuses

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

**WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD.  
THIS DRAFT IS NOT CURRENT BEYOND 17 April 2024**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email [cservices@bsigroup.com](mailto:cservices@bsigroup.com). British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <http://standardsdevelopment.bsigroup.com>

---

Responsible Committee Secretary: **Mr Simon Bounds (BSI)**  
Direct tel: **0208 996 7281**  
E-mail: [simon.bounds@bsigroup.com](mailto:simon.bounds@bsigroup.com)

## Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

## UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

## Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

## Template for comments and secretariat observations

|                  |                        |
|------------------|------------------------|
| Date: xx/xx/20xx | Document: ISO/DIS xxxx |
|------------------|------------------------|

| 1  | 2                                          | (3)                          | 4               | 5                                                                                                                                  | (6)                                                                      | 7                                                  |
|----|--------------------------------------------|------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------|
| MB | Clause No./ Subclause No./Annex (e.g. 3.1) | Paragraph/Figure/ Table/Note | Type of comment | Commend (justification for change) by the MB                                                                                       | Proposed change by the MB                                                | Secretariat observations on each comment submitted |
|    | 3.1                                        | Definition 1                 | ed              | Definition is ambiguous and needs clarifying.                                                                                      | Amend to read '...so that the mains connector to which no connection...' |                                                    |
|    | 6.4                                        | Paragraph 2                  | te              | The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK. | Delete reference to UV photometer.                                       |                                                    |



32/265/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

**IEC 63523 ED1**

DATE OF CIRCULATION:

**2024-02-23**

CLOSING DATE FOR COMMENTS:

**2024-05-17**

SUPERSEDES DOCUMENTS:

**32/262/NP, 32/264A/RVN**

IEC TC 32 : FUSES

SECRETARIAT:

France

SECRETARY:

Mr Jean-François De Palma

OF INTEREST TO THE FOLLOWING COMMITTEES:

SC 32A, SC 32B

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

**High-Voltage DC Fuses**

NOTE FROM TC/SC OFFICERS:

Copyright © 2024 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

## CONTENTS

|                                                                           |    |
|---------------------------------------------------------------------------|----|
| <b>FOREWORD</b> .....                                                     | 6  |
| <b>1 General</b> .....                                                    | 7  |
| 1.1 Scope and object .....                                                | 7  |
| 1.2 Normative references .....                                            | 7  |
| <b>2 Terms and definitions</b> .....                                      | 8  |
| 2.1 Fuses and their component parts .....                                 | 8  |
| 2.1.1 fuse .....                                                          | 8  |
| 2.1.2 Fuse-carrier .....                                                  | 8  |
| 2.1.3 Fuse-link .....                                                     | 8  |
| 2.1.4 Fuse-contact .....                                                  | 8  |
| 2.1.5 Fuse-element .....                                                  | 8  |
| 2.1.6 Indicating device (indicator) .....                                 | 8  |
| 2.1.7 Striker .....                                                       | 8  |
| 2.1.8 Terminal .....                                                      | 8  |
| 2.2 General terms .....                                                   | 8  |
| 2.2.1 Enclosed fuse-link .....                                            | 8  |
| 2.2.2 Current-limiting fuse-link .....                                    | 9  |
| 2.2.3 "g" fuse-link .....                                                 | 9  |
| 2.2.4 "a" fuse-link .....                                                 | 9  |
| 2.2.5 Temperatures .....                                                  | 9  |
| 2.2.6 Overcurrent selectivity. ....                                       | 9  |
| 2.2.7 Fuse system .....                                                   | 9  |
| 2.2.8 Size .....                                                          | 9  |
| 2.2.9 Homogeneous series of fuse-links .....                              | 9  |
| 2.2.10 Utilization class (of a fuse-link) .....                           | 9  |
| 2.2.11 Fuses for use by authorized persons .....                          | 9  |
| 2.2.12 Types of overcurrent .....                                         | 10 |
| 2.2.12.1 Short circuit current (symbol $I_{sc}$ ), (unit:A) .....         | 10 |
| 2.2.12.2 Short-circuit current .....                                      | 10 |
| 2.3 Characteristic quantities .....                                       | 10 |
| 2.3.1 Rating .....                                                        | 10 |
| 2.3.2 prospective current (of a circuit and with respect to a fuse) ..... | 10 |
| 2.3.3 gates .....                                                         | 10 |
| 2.3.4 breaking range .....                                                | 10 |
| 2.3.5 cut-off current .....                                               | 10 |
| 2.3.6 cut-off current characteristic; .....                               | 10 |
| 2.3.7 peak withstand current (of a fuse-holder) .....                     | 10 |
| 2.3.8 pre-arcing time (melting time) .....                                | 11 |
| 2.3.9 arcing time of a fuse .....                                         | 11 |
| 2.3.10 operating time; total clearing time .....                          | 11 |
| 2.3.11 $I^2t$ ; Joule integral .....                                      | 11 |
| 2.3.12 $I^2t$ characteristic .....                                        | 11 |

|        |                                                                      |    |
|--------|----------------------------------------------------------------------|----|
| 2.3.13 | rated current of a fuse-link $I_n$ .....                             | 11 |
| 2.3.14 | time-current characteristic.....                                     | 11 |
| 2.3.15 | conventional non-fusing current $I_{nf}$ .....                       | 11 |
| 2.3.16 | conventional fusing current $I_f$ .....                              | 11 |
| 2.3.17 | power dissipation (of a fuse-link).....                              | 11 |
| 2.3.18 | acceptable power dissipation (of a fuse-base or a fuse-holder) ..... | 11 |
| 2.3.19 | recovery voltage .....                                               | 12 |
| 2.3.20 | arc voltage of a fuse .....                                          | 12 |
| 2.3.21 | isolating distance (for a fuse) .....                                | 12 |
| 2.4    | General terms .....                                                  | 12 |
| 2.4.1  | semiconductor device .....                                           | 12 |
| 2.4.2  | semiconductor fuse-link .....                                        | 12 |
| 2.4.3  | PV fuse-link (general) .....                                         | 12 |
| 2.5    | battery fuse-link .....                                              | 12 |
| 2.6    | signalling device.....                                               | 12 |
| 2.7    | voltage source inverter VSI .....                                    | 12 |
| 2.8    | voltage source inverter fuse-link (VSI fuse-link).....               | 13 |
| 3      | Conditions for operation in service .....                            | 13 |
| 3.1    | Ambient air temperature ( $T_a$ ).....                               | 13 |
| 3.2    | Altitude.....                                                        | 13 |
| 3.3    | Atmospheric conditions .....                                         | 13 |
| 3.4    | Voltage .....                                                        | 13 |
| 3.5    | Current.....                                                         | 13 |
| 3.6    | Time constant ( $\tau = L/R$ ) .....                                 | 13 |
| 3.7    | Conditions of installation .....                                     | 14 |
| 3.8    | Utilization class .....                                              | 14 |
| 4      | Classification .....                                                 | 14 |
| 5      | Characteristics of fuses.....                                        | 14 |
| 5.1    | Summary of characteristics .....                                     | 14 |
| 5.1.1  | Rated voltage .....                                                  | 14 |
| 5.2    | Rated current .....                                                  | 14 |
| 5.2.1  | Rated current of the fuse-link .....                                 | 14 |
| 5.3    | Rated power dissipation .....                                        | 14 |
| 5.3.1  | Rated power dissipation of the fuse-link .....                       | 14 |
| 5.4    | Limits of time-current characteristics .....                         | 14 |
| 5.4.1  | Time-current characteristics, time-current zones .....               | 14 |
| 5.4.2  | Time-current characteristics, time-current zones .....               | 15 |
| 5.4.3  | Conventional times and currents .....                                | 15 |
| 5.4.4  | Gates.....                                                           | 15 |
| 5.5    | Breaking range and breaking capacity .....                           | 15 |
| 5.5.1  | Breaking range and utilization class .....                           | 15 |
| 5.5.2  | Rated breaking capacity.....                                         | 16 |
| 5.6    | Cut-off current and $I^2t$ characteristics .....                     | 16 |
| 5.6.1  | General remarks .....                                                | 16 |
| 5.6.2  | Cut-off current characteristics .....                                | 16 |

|                                                      |                                                                          |    |
|------------------------------------------------------|--------------------------------------------------------------------------|----|
| 5.6.3                                                | $I^2t$ characteristics .....                                             | 16 |
| 5.7                                                  | Arc voltage characteristics .....                                        | 16 |
| 6                                                    | Markings .....                                                           | 16 |
| 6.1                                                  | General .....                                                            | 16 |
| 6.2                                                  | Markings on fuse-links .....                                             | 16 |
| 6.3                                                  | Marking symbols .....                                                    | 17 |
| 7                                                    | Standard conditions for construction .....                               | 17 |
| 7.1                                                  | Mechanical design .....                                                  | 17 |
| 7.1.1                                                | Replacement of fuse-links .....                                          | 17 |
| 7.1.2                                                | Connections, including terminals .....                                   | 17 |
| 7.1.3                                                | Fuse-contacts .....                                                      | 18 |
| 7.1.4                                                | Mechanical strength of the fuse-link .....                               | 18 |
| 7.2                                                  | Temperature rise and power dissipation of the fuse-link .....            | 18 |
| Table 1 – Temperature limits $T$ for terminals ..... |                                                                          | 18 |
| 7.3                                                  | Operation .....                                                          | 18 |
| 7.4                                                  | Rated Maximum Breaking capacity .....                                    | 19 |
| 7.5                                                  | Cut-off current characteristic .....                                     | 19 |
| 7.6                                                  | $I^2t$ characteristics .....                                             | 19 |
| 7.7                                                  | Resistance to heat .....                                                 | 19 |
| 7.8                                                  | Mechanical strength .....                                                | 19 |
| 7.9                                                  | Resistance to corrosion .....                                            | 19 |
| 7.9.1                                                | Resistance to rusting .....                                              | 19 |
| 7.10                                                 | Resistance to abnormal heat and fire .....                               | 19 |
| 7.11                                                 | Electromagnetic compatibility .....                                      | 19 |
| 7.12                                                 | Arc voltage characteristics .....                                        | 19 |
| 7.13                                                 | Special operating conditions .....                                       | 20 |
| 8                                                    | Tests .....                                                              | 20 |
| 8.1                                                  | General .....                                                            | 20 |
| 8.1.1                                                | Kind of tests .....                                                      | 20 |
| 8.1.2                                                | Ambient air temperature ( $T_a$ ) .....                                  | 20 |
| 8.1.3                                                | Condition of the fuse .....                                              | 20 |
| 8.1.4                                                | Arrangement of the fuse-link .....                                       | 20 |
| 8.2                                                  | Temperature rise and power dissipation .....                             | 22 |
| 8.4                                                  | No.1 Maximum rated breaking capacity and operating characteristics ..... | 22 |
| 8.2                                                  | Verification of temperature rise limits and power dissipation .....      | 22 |
| 8.2.1                                                | Arrangement of the fuse-link .....                                       | 22 |
| 8.2.2                                                | Measurement of temperature .....                                         | 22 |
| 8.2.3                                                | Measurement of power dissipation of the fuse-link .....                  | 22 |
| 8.2.4                                                | Test method .....                                                        | 22 |
| 8.2.5                                                | Acceptability of test results .....                                      | 25 |
| 8.3                                                  | Verification of operation .....                                          | 25 |
| 8.3.1                                                | Arrangement of fuse-link .....                                           | 25 |
| 8.3.2                                                | Ambient air temperature .....                                            | 25 |
| 8.3.3                                                | Test method and acceptability of test results .....                      | 25 |
| 8.4                                                  | Verification of the breaking capacity .....                              | 26 |

|       |                                                                                                                |    |
|-------|----------------------------------------------------------------------------------------------------------------|----|
| 8.4.1 | Arrangement of the fuse .....                                                                                  | 26 |
| 8.4.2 | Characteristics of the test circuit .....                                                                      | 26 |
| 8.4.3 | Measuring instruments .....                                                                                    | 26 |
| 8.4.4 | Calibration of test circuit .....                                                                              | 27 |
| 8.4.5 | Test method .....                                                                                              | 27 |
| 8.4.6 | Ambient air temperature .....                                                                                  | 28 |
| 8.4.7 | Interpretation of oscillograms .....                                                                           | 28 |
| 8.4.8 | Acceptability of test results .....                                                                            | 29 |
| 8.5   | Verification of the cut-off current characteristic .....                                                       | 30 |
| 8.5.1 | Test method .....                                                                                              | 30 |
| 8.5.2 | Acceptability of test results .....                                                                            | 30 |
| 8.6   | Verification of the $I^2t$ characteristics .....                                                               | 30 |
| 8.6.1 | Test method .....                                                                                              | 30 |
| 8.6.2 | Acceptability of test results .....                                                                            | 30 |
| 8.7   | Verification of arc voltage characteristics and acceptability of test results .....                            | 30 |
| 8.8   | Verification of resistance to heat .....                                                                       | 30 |
| 8.9   | Mechanical and miscellaneous tests .....                                                                       | 31 |
| 8.9.1 | Mechanical strength .....                                                                                      | 31 |
| 8.9.2 | Verification of freedom from season cracking .....                                                             | 31 |
| 8.9.3 | Verification of resistance to rusting .....                                                                    | 31 |
| 8.9.4 | Test for marking .....                                                                                         | 31 |
|       | Bibliography .....                                                                                             | 36 |
|       | Figure 1 – Typical diagram of the circuit used for breaking capacity test (see 8.5) .....                      | 32 |
|       | Figure 2 – Interpretation of oscillograms taken during the DC .....                                            | 33 |
|       | Figure 3 – Example of a conventional test arrangement for bolted fuse-links .....                              | 34 |
|       | Figure 4 – Example of a conventional test arrangement for blade contact fuse-links .....                       | 35 |
|       | Table 1 – Temperature limits T for terminals .....                                                             | 18 |
|       | Table 2 – Maximum arc voltage .....                                                                            | 18 |
|       | Table 3 – List of complete tests .....                                                                         | 20 |
|       | Table 4 – Survey of tests on fuse-links of the smallest rated current of a homogeneous series<br>22            |    |
|       | Table 5 – Cross-sectional area of copper conductors for tests corresponding to Subclauses 8.2<br>and 8.3 ..... | 24 |
|       | Table 6 – Values for breaking-capacity tests on DC and VSI <sup>d</sup> fuses .....                            | 29 |

# High Voltage DC fuse-links

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### FUSES

#### Fuse-links with DC rated voltage above 1,5 kV for the protection of DC circuits

### 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) *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.*
- International Standard IEC 63523 ED1 has been prepared by IEC technical committee 32: Fuses.*
- For reasons of convenience, when a part of this publication has come from other publications, a remark to this effect has been inserted in the text.*
- The committee has decided that the contents of the base publication and its amendments 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.*

## FUSES

### Fuse-links with DC rated voltage above 1,5 kV for the protection of DC circuits

#### 1 General

##### 1.1 Scope and object

This standard is applicable to fuses incorporating enclosed current-limiting fuse-links with rated breaking capacities of not less than 6 kA, intended for protecting DC circuits of nominal voltages higher than 1500V DC with time constants below 3 ms.

The object of this standard is to establish the characteristics of fuse-links. For this purpose, this standard refers in particular to

- *the following characteristics of fuses:*
  - *rated values.*
  - *temperature rise in normal service.*
  - *power dissipation and acceptable power dissipation*
  - *time/current characteristics*
  - *breaking capacity*
  - *cut-off current characteristics and their  $I^2t$  characteristics*
  - *arc voltage characteristics*
- *type test for verification of the characteristics of fuses*
- *the marking of fuses*

Fuse-links in this standard can also be referred to as

- semiconductor fuse-links (aR, gR, gS)
- Photovoltaic fuse-links (gPV)
- Battery fuse-links (aBat, gBat)

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.

##### 1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- IEC 60269-1, Edition 5.0 2024-XX: Low-voltage fuses–Part 1: General requirements
- IEC 60269-4, Edition 6.1 2024-XX: Low-voltage fuses–Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices
- IEC 60269-5, Edition 2.1 2020-12: Part 5: Guidance for the application of low-voltage fuses
- IEC 60269-6, Edition 1.1 2021-04: Low-voltage fuses–Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems
- IEC 60269-7, Edition 1.0 2020-12: Low voltage fuses–Part 7: Supplementary Requirements for fuse-links for the protection of batteries and battery systems
- ISO/IEC SYMBOL:2004 DB: Graphical symbols for use on equipment - 12-month subscription to regularly updated online database comprising all graphical symbols published in IEC 60417 and ISO 7000 Graphical symbols for use on equipment.
- ISO 3:1973 Preferred numbers — Series of preferred numbers

## 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

*NOTE For general definitions concerning fuses, see also IEC 60050-441.*

### 2.1 Fuses and their component parts

#### 2.1.1 fuse

device that by the fusing of one or more of its specially designed and proportioned components opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time. The fuse comprises all the parts that form the complete device [IEV 441-18-01].

##### 2.1.1.1 fuse-holder

combination of the fuse-base with its fuse-carrier [IEV 441-18-14].

*NOTE* The term "fuse-holder" is used in this standard, covers fuse-bases and/or fuse-carriers, if no clearer distinction is necessary.

##### 2.1.1.2 Fuse-base (fuse-mount)

fixed part of a fuse provided with contacts and terminals [IEV 441-18-02].

*NOTE* Where applicable, covers are considered as part of the fuse-base.

#### 2.1.2 Fuse-carrier

movable part of a fuse designed to carry a fuse-link [IEV 441-18-13].

#### 2.1.3 Fuse-link

part of a fuse including the fuse-element(s), intended to be replaced after the fuse has operated [IEV 441-18-09].

#### 2.1.4 Fuse-contact

two or more conductive parts designed to ensure circuit continuity between a fuse-link and the corresponding fuse-holder.

#### 2.1.5 Fuse-element

part of the fuse-link designed to melt under the action of current exceeding some definite value for a definite period of time.

[IEV 441-18-08]

*NOTE:* The fuse-link may comprise several fuse-elements in parallel.

#### 2.1.6 Indicating device (indicator)

part of a fuse provided to indicate whether the fuse has operated [IEV 441-18-17].

#### 2.1.7 Striker

mechanical device forming part of a fuse-link which, when the fuse operates, releases the energy required to cause operation of other apparatus or indicators or to provide interlocking [IEV 441-18-18].

#### 2.1.8 Terminal

conductive part of a fuse provided for electric connection to external circuits.

*NOTE:* Terminals may be distinguished according to the kind of circuits for which they are intended (for example, main terminal, earth terminal, etc.) and according to their design (for example, screw terminal, plug terminal, etc.).

### 2.2 General terms

#### 2.2.1 Enclosed fuse-link

fuse-link in which the fuse-element(s) is (are) totally enclosed, so that during operation within its rating it cannot produce any harmful external effects, for example, due to development of an arc, the release of gas or the ejection of flame or metallic particles [IEV 441-18-12].

### 2.2.2 Current-limiting fuse-link

fuse-link that during and by its operation in a specified current range, limits the current to a substantially lower value than the peak value of the prospective current [IEV 441-18-10].

### 2.2.3 "g" fuse-link

(full-range breaking-capacity fuse-link)  
current-limiting fuse-link capable of breaking under specified conditions all currents, which cause melting of the fuse-element up to its rated breaking capacity.

### 2.2.4 "a" fuse-link

(partial-range breaking-capacity fuse-link)  
current-limiting fuse-link capable of breaking under specified conditions all currents between its rated minimum breaking current and its rated maximum breaking current.

NOTE 1 to Entry: "a" fuse-links are generally used to provide short-circuit protection, where protection is required above its minimum breaking current capacity. These are used in conjunction with another suitable switching device designed to interrupt such small overcurrents.

### 2.2.5 Temperatures

#### 2.2.5.1 Ambient air temperature $T_a$

the temperature of the air surrounding the fuse (at about 1 m from the fuse or its enclosure, if any)

#### 2.2.5.2 Fuse-component temperature $T$

fuse-component (contact, terminal, etc.) temperature  $T$  is that of the relevant part.

### 2.2.6 Overcurrent selectivity.

coordination of the relevant characteristics of two or more overcurrent protective devices such that, on the occurrence of overcurrents within stated limits, the device intended to operate within these limits does so, while the other(s) do(es) not.

### 2.2.7 Fuse system

family of fuses following the same physical design principles with respect to the shape of the fuse-links, type of contact, etc.

### 2.2.8 Size

specified set of dimensions of fuses within a fuse system. Each individual size covers a given range of rated currents for which the specified dimensions of the fuses remain unchanged.

### 2.2.9 Homogeneous series of fuse-links

series of fuse-links, within a given size, deviating from each other only in such characteristics that for a given test, the testing of one or a reduced number of particular fuse-links of that series may be taken as representative for all the fuse-links of the homogeneous series [IEV 441-18-34, modified],

NOTE 1 to Entry: "The characteristics by which the fuse-links of a homogeneous series may deviate and details on which of the fuse-links shall be tested are specified in association with the tests concerned (see Tables 12 and 13).

### 2.2.10 Utilization class (of a fuse-link)

combination of specified requirements related to the conditions in which the fuse-link fulfils its purpose, selected to represent a characteristic group of practical applications (see 5.5.1).

### 2.2.11 Fuses for use by authorized persons

fuses intended to be used in installations where the fuse-links are accessible to and intended to be replaced by authorized persons only.

**2.2.12 Types of overcurrent****2.2.12.1 Short circuit current (symbol  $I_{sc}$ ), (unit:A)**

electric current at the output terminals of a PV device at a particular temperature and irradiance when the device output voltage is equal or close to zero.

**2.2.12.2 Short-circuit current**

Maximum current which can be delivered by a cell or battery into an external circuit with zero electric resistance, or an external circuit which depresses the cell or battery voltage to approximately zero volts [IEV 482-03-26].

**2.3 Characteristic quantities****2.3.1 Rating**

general term employed to designate the characteristic values that together define the working conditions upon which the tests are based and for which the equipment is designed. [IEV 441-18-36]

NOTE1 to entry: Rated values usually stated for fuses are: voltage, current, breaking capacity, power dissipation and acceptable power dissipation-in the case of DC, when ripple is present, the rated voltage is stated as a mean value, the rated current as an r.m.s. value. The above applies to any value of voltage and current, if not indicated otherwise.

**2.3.1.1 Rated voltage (of a fuse-link) [IEV 442-09-10 modified]**

Rated value of the voltage assigned by the manufacturer to a fuse-link to which operation and performance characteristics are referred.

Note 1 to entry: Equipment may have more than one rated voltage value or may have a rated voltage range.

**2.3.1.2 Rated VSI voltage (of a fuse-link)**

Rated value of the voltage assigned by the manufacturer to a VSI fuse-link to which operation and performance characteristics are referred.

**2.3.1.3 Rated current [IEV 442-01-02 modified]**

the current assigned by the manufacturer for a specified operating condition of fuse-link.

**2.3.1.4 Rated breaking capacity of a fuse [IEV 441-17-08 modified]**

Value of prospective current that a fuse is capable of breaking at a stated DC voltage under prescribed conditions of use and behaviour.

**2.3.2 prospective current (of a circuit and with respect to a fuse)**

Current that would flow in the circuit if each pole of the fuse were replaced by a conductor of negligible impedance [IEV 441-17-01 modified].

**2.3.3 gates**

Limiting values within which the characteristics, for example time-current characteristics, are obtained

**2.3.4 breaking range**

Breaking range is a range of prospective currents within which the breaking capacity of a fuse-link under specified conditions.

**2.3.5 cut-off current**

Maximum instantaneous value reached by the current during the breaking operation of a fuse-link when it operates in such a manner as to prevent the current from reaching the otherwise attainable maximum.

**2.3.6 cut-off current characteristic;**

also named let-through current characteristic [IEV 441-17-14].

Curve giving the cut-off current as a function of the prospective current under stated conditions of operation.

**2.3.7 peak withstand current (of a fuse-holder)**

value of cut-off current that the fuse-holder can withstand.