

Miniature fuses —

Part 2: Specification for cartridge fuse-links

The European Standard EN 60127-2:1991 has the status of a British Standard

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Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the National Committees of the following countries.

Austria	Italy
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National foreword

This British Standard has been prepared under the direction of Technical Committee PEL/32/3 (formerly PEL 78) and is the English language version of EN 60127-2, *Miniature fuses — Part 2: Cartridge fuse-links* including amendments A1:1995 and A2:2000 which endorses IEC 60127-2:1989 *Miniature fuses — Part 2: Cartridge fuse-links* including amendment 1:1995 and 2:2000 published by the International Electrotechnical Commission (IEC).

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 2 is indicated by **A2** **A2**.

This British Standard is one of a series. Together the standards supersede BS 4265 which is withdrawn. The new standards are as follows.

BS EN 60127-1, *Definitions for miniature fuses and general requirements for miniature fuse-links*.

BS EN 60127-2, *Specification for cartridge fuse-links*.

BS EN 60127-3, *Specification for sub-miniature fuse-links*.

BS EN 60127-5, *Guide for the quality assessment of miniature fuse-links*.

BS EN 60127-6, *Fuse-holders for miniature cartridge fuse-links*.

It is anticipated that when IEC 127-4 is published it will be approved by CENELEC as EN 60127-4. IEC 127-4 TTD:1989 is identical with DD 183:1989 *Specification for universal modular fuses*.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

The foreword and preface of IEC 127-2:1989 which do not form part of the text of EN 60127-2 have been quoted in National appendix NA.

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given for information only. National appendices are designated “informative”.

For the purposes of this British Standard, any references to IEC page numbers in the text should be ignored.

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 28, an inside back cover and a back cover.

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Descriptors: Miniature fuse, cartridge fuse-link, specification, rated characteristic, dimension, test

English version

Miniature fuses — Part 2: Cartridge fuse-links

(includes amendments A1:1995 and A2:2000)
(IEC 60127-2:1989 + A1:1995 + A2:2000)

Coupe-circuit miniatures —
Deuxième partie: Cartouches
(inclut les amendements A1:1995 et A2:2000)
(CEI 60127-2:1989 + A1:1995 + A2:2000)

Geräteschutzsicherungen —
Teil 2: Sicherungseinsätze
(enthält Änderungen A1:1995 und A2:2000)
(IEC 60127-2:1989 + A1:1995 + A2:2000)

This European Standard was approved by CENELEC on 1 February 1991. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 127-2:1989, as corrected by corrigendum March 1990, could be accepted without textual changes, has shown that no CENELEC common modifications were necessary for the acceptance as European Standard. The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 60127-2 on 1 February 1991.

The following dates were fixed:

- latest date of announcement of the EN at national level (doa) 1991-09-01
- latest date of publication of an identical national standard (dop) 1992-03-01
- latest date of withdrawal of conflicting national standards (dow) 1992-03-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative.

For products which have complied with the HD 109.1 S1:1990 before 1992-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-03-01.

Endorsement notice

The text of the International Standard IEC 127-2:1989 with its corrigendum March 1990 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document 32C/134/DIS, future amendment 1 to IEC 127-2:1989, prepared by SC 32C, Miniature fuses, of IEC TC 32, Fuses, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60127-2:1991 on 1995-09-20.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-07-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1996-07-01

For products which have complied with EN 60127-2:1991 before 1996-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-07-01.

Foreword to amendment A2

The text of document 32C/249/FDIS, future amendment 2 to IEC 60127-2:1989, prepared by SC 32C, Miniature fuses, of IEC TC 32, Fuses, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60127-2:1991 on 2000-11-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-08-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-11-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex A and Annex ZA are normative. Annex ZA has been added by CENELEC.

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Introduction

According to the wish expressed by the users of miniature fuses, all standards, recommendations and other documents relating to miniature fuses should have the same publication number in order to facilitate reference to fuses in other specifications, for example, equipment specifications.

Furthermore, a single publication number and subdivision into parts would facilitate the establishment of new standards, because clauses containing general requirements need not be repeated.

The new IEC 127 series is thus subdivided as follows:

IEC 127, *Miniature fuses* (general title).

IEC 127-1, *Definitions for miniature fuses and general requirements for miniature fuse-links*.
(Issued in 1988).

IEC 127-2, *Cartridge fuse-links*.

IEC 127-3, *Sub-miniature fuse-links*.

IEC 127-4, *Universal modular fuse-links*.

IEC 127-5, *Guidelines for quality assessment of miniature fuse-links*.

IEC 127-6, *Fuse-holders* (previously IEC 257).

IEC 127-7, (Free for further documents).

IEC 127-8, (Free for further documents).

IEC 127-9, *Test-holders and test-circuits*.

IEC 127-10, *User guide*.

The second part of the complete standard covers additional requirements, test equipment and Standard Sheets.

The SI system of units is used throughout this standard.

Section 1. Additional requirements and test equipment

1 Scope and object

This standard relates to special requirements applicable to cartridge fuse-links for miniature fuses with dimensions of 5 mm × 20 mm and 6,3 mm × 32 mm for the protection of electric appliances, electronic equipment and component parts thereof, normally intended for use indoors.

It does not apply to fuses for appliances intended to be used under special conditions, such as in corrosive or explosive atmospheres.

This standard applies in addition to the requirements of Part 1.





The object of this standard is to define special and additional test methods for cartridge fuse-links applying in addition to the requirements of Part 1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60127. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60127 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-2-20:1979, *Environmental testing — Part 2: Tests — Test T: Soldering*.

IEC 60068-2-21:1999, *Environmental testing — Part 2-21: Tests — Test U: Robustness of terminations and integral mounting devices*.

IEC 60127-1:1988, *Miniature fuses — Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*¹⁾. [Amendment 1 (1999)] 

¹⁾  There exists a consolidated edition 1.1 (1999) that includes IEC 60127-1 (1988) and its amendment 1 (1999). 

A2 IEC 60249-2-5:1987, *Base materials for printed circuits — Part 2: Specifications — Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test).*

ISO 3:1973, *Preferred numbers — Series of preferred numbers.* **A2**

3 Definitions (see Part 1)

4 General requirements (see Part 1)

5 Standard ratings (see Part 1)

6 Marking

In addition to the requirements of Clause 6 in Part 1, the following criterion is to be observed:

6.1 In addition to the requirements of Sub-clause 6.1 in Part 1 each fuse-link shall be marked with:

- A1** e) A symbol denoting the rated breaking capacity. This symbol shall be placed between the marking for the rated current and the marking for the rated voltage.

These symbols are:

H: denoting high-breaking capacity

L: denoting low-breaking capacity.

E: denoting enhanced breaking capacity.

Examples of marking:

T	3	1	5	L	2	5	0	V
---	---	---	---	---	---	---	---	---

		F	4	H	2	5	0	V
--	--	---	---	---	---	---	---	---

T	3	1	5	E	2	5	0	V
---	---	---	---	---	---	---	---	---

A1

6.4 The values for “d” and “s” shall be $0,8 \pm 0,2$ mm.

7 General notes on tests

In addition to the requirements of Clause 7 in Part 1, the following criteria are to be observed:

7.2.1 The number of fuse-links required is 48, of which 12 are kept as spares in case some of the tests have to be repeated.

7.2.4 Schedule for testing cartridge fuse-links for miniature fuses, see Table 1, page 8.

7.3.1 Fuse-bases for tests

For tests that require a fuse-base for mounting the fuse-links, bases according to Figure 1, Figure 2 or Figure 3 shall be used as appropriate.

The contact resistance between each contact and a silvered brass piece having the same nominal dimensions and shape as the fuse-link to be tested shall not exceed 3 mΩ and is measured under the following conditions:

- in order to prevent the breakdown of thin insulating layers on the contacts, the e.m.f. of the circuit shall not exceed 20 mV (d.c. or a.c. peak);
- in order to prevent undue heating of the contacts, the current flowing shall not exceed 1 A.

Metal parts of the fuse-base, except the spring and connections, shall be made of brass. Brass parts of the fuse-base and of the gauge for measuring contact resistance shall have a copper content between 58 % and 70 %. Contacts shall be silver-plated.

For fuse-links with rated currents up to and including 10 A, a fuse-base according to Figure 1, page 9, shall be used. The contact force shall be between 4 N and 6 N. The flexible lead and terminal wires shall be of copper and have a cross-sectional area of 1 mm²; the length of each of the terminal wires shall be approximately 500 mm.

For fuse-links with rated currents exceeding 10 A, a fuse-base according to Figure 2, page 10, shall be used. The contact force shall be between 8 N and 12 N. The flexible lead and terminal wires shall be of copper and have a cross-sectional area of 6 mm²; the length of each of the terminal wires shall be approximately 500 mm.

For breaking capacity tests, a fuse-base according to Figure 3, page 11, with the same contact force and conductor cross-sectional area as for the base in Figure 2 shall be used.

8 Dimensions and construction

In addition to the requirements of Clause 8 in Part 1, the following criteria and tests are to be observed:

8.2 Construction

Where a “non-transparent” fuse-link is specified, a transparent case (body) may be used provided that there is an opaque filler.

Compliance is checked by inspection.

This standard is based on the assumption that the case (body) is made of glass, ceramic or similar non-combustible material.

For other materials, additional tests may be necessary.

8.3 Terminations

Fuse-links shall have at each end a metallic cap of cylindrical form.

The outer ends of the cylindrical caps shall be substantially flat and at right angles to the axis.

The end caps shall be firmly attached so that it is not possible to remove them without damaging the fuse-link.

Compliance is checked by inspection and by the following test:

The samples are immersed in water for 24 h at a temperature between 15 °C and 35 °C. After removal from the water, an axial pull steadily increasing to 5 N is applied to each cap for 1 min.

The caps shall remain firmly attached.

A suitable test apparatus for this purpose is given in Figure 7, page 13, and shall be used in cases of dispute. By using this apparatus, the test can be performed without distorting the end caps.

8.4 Alignment and configuration of terminations

The end caps and the body of the fuse-link shall be in reasonable alignment.

Compliance is checked by means of the gauge shown in Figure 4, page 12.

The entire length of the fuse-link shall pass through the gauge by the fuse-link's own weight.

9 Electrical requirements

In addition to the requirements of Clause 9 in Part 1, the following criteria and tests are to be observed:

9.3 Breaking capacity

9.3.1 In addition to the requirements of Sub-clause 9.3.1 in Part 1, the following is to be observed:

A.C. shall be used for this test.

A typical test circuit for the rated high-breaking capacity test is given in Figure 5, page 12, and for the rated low-breaking capacity test in Figure 6, page 12. A test base according to Figure 3, page 11, shall be used.

The power factor of the test circuit at rated high-breaking capacity shall be between 0,7 and 0,8. For tests at lower prospective currents, the inductance in the circuit shall remain constant and the current shall be adjusted by changing only the resistance.

9.3.2 In addition to the criteria of failure prescribed in Part 1, in each of the tests the fuse-link shall operate satisfactorily without any of the following phenomena:

- fusing together of the contacts;
- illegibility of marking after test;
- piercing of the external surfaces of the end caps, visible to the naked eye.

The following phenomena are neglected:

- black spots on the end caps;
- small deformation of the end caps;
- cracking of the fuse-link.