

Miniature fuses

Part 4: Universal modular fuse-links (UMF) — Through-hole and surface mount types

ICS 29.120.50

National foreword

This British Standard is the UK implementation of EN 60127-4:2005+A2:2013. It is identical to IEC 60127-4:2005, incorporating amendments 1:2008 and 2:2012. It supersedes BS EN 60127-4:2005+A1:2009, which will be withdrawn on 11 January 2016.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee PEL/32, Fuses.

A list of organizations represented on this committee can be obtained on request to its secretary.

The publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Miniature fuses
Part 4: Universal modular fuse-links (UMF) –
Through-hole and surface mount types
(IEC 60127-4:2005)

Coupe-circuit miniatures
Partie 4: Eléments de remplacement
modulaires universels (UMF) –
Types de montage en surface
et montage par trous
(CEI 60127-4:2005)

Geräteschutzsicherungen
Teil 4: Welteinheitliche modulare
Sicherungseinsätze (UMF) –
Bauarten für Steck- und
Oberflächenmontage
(IEC 60127-4:2005)

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CENELEC

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

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Foreword

The text of document 32C/362/FDIS, future edition 3 of IEC 60127-4, 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 EN 60127-4 on 2005-03-01.

This European Standard supersedes EN 60127-4:1996 + A1:2002 + A2:2003.

The major technical changes with regard to the previous edition are as follows: introduction of physically smaller devices with lower rated voltages. Fuse-link temperature test (9.7) is modified.

The clauses of this standard supplement, modify or replace the corresponding clauses in EN 60127-1.

Where there is no corresponding clause or subclause in this standard, the clause or subclause of EN 60127-1 applies without modification as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in EN 60127-1 is to be adapted accordingly.

The following dates were fixed:

- latest date by which the EN has to be implemented
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- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2008-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60127-4:2005 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 standards indicated:

IEC 60115-1	NOTE	Harmonized as EN 60115-1:2001 (modified).
IEC 61191-2	NOTE	Harmonized as EN 61191-2:1998 (not modified).
ISO 9453	NOTE	Harmonized as EN 29453:1993 (not modified).

Foreword to amendment A1

The text of document 32C/411/FDIS, future amendment 1 to IEC 60127-4:2005, 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 60127-4:2005 on 2009-02-01.

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with the amendment have to be withdrawn (dow) 2012-02-01

Endorsement notice

The text of amendment 1:2008 to the International Standard IEC 60127-4:2005 was approved by CENELEC as an amendment to the European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61190-1-2	NOTE	Harmonized as EN 61190-1-2:2007 (not modified).
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Foreword to amendment A2

The text of document 32C/456/CDV, future amendment 2 to edition 3 of IEC 60127-4, prepared by SC 32C "Miniature fuses" of IEC/TC 32 "Fuses" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60127-4:2005/A2:2013.

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standards conflicting with the
document have to be withdrawn

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

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 60127-4:2005/A2:2012 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

The trend towards miniaturization of electronic equipment has caused users to require fuse-links of small dimensions, and of appropriate design for application to printed circuit boards or other substrate systems, possibly by automatic means. These fuse-links should be designed to incorporate a degree of non-interchangeability.

Rated voltages of 12,5 V, 25 V, 32 V, 50 V, 63 V, 125 V, and 250 V are specified together with the following characteristics: very quick acting (FF), quick acting (F), time-lag (T) and long time-lag (TT).

Because of the increasing importance of limitation of transient overvoltages in new technology, recommendations are included for limits to the overvoltages produced by these fuses under specified test conditions related to typical circuit configurations.

The option is given to specify the breaking capacity with alternating current or direct current; it is considered that fuses that meet the d.c. requirement will meet the a.c. requirement; however, testing is required to validate this. Fuses may be dual rated, in which case the manufacturer's literature should be referred to.

 Text deleted 

MINIATURE FUSES –

Part 4: Universal modular fuse-links (UMF) – Through-hole and surface mount types

1 Scope and object

This part of IEC 60127 relates to universal modular fuse-links (UMF) for printed circuits and other substrate systems, used for the protection of electric appliances, electronic equipment, and component parts thereof, normally intended to be used indoors.

It does not apply to fuse-links for appliances intended to be used under special conditions, such as in a corrosive or explosive atmosphere.

These fuses are normally intended to be mounted or replaced only by appropriately skilled persons using specialized equipment.

 Text deleted 

This standard applies in addition to the requirements of IEC 60127-1.

The objectives of this part of IEC 60127 are as given in IEC 60127-1, with the additional requirement of a degree of non-interchangeability.

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 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads* 

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

IEC 60068-2-58:2004, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60127-1:1988, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*¹

Amendment 1 (1999)

Amendment 2 (2002)

IEC 60194:1999, *Printed board design, manufacture and assembly – Terms and definitions*

¹ There exists a consolidated version (2003).

IEC 60664-1:1992, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*²
Amendment 1 (2000)
Amendment 2 (2002)

IEC 61249-2-7:2002, *Materials for printed boards and other interconnecting structures – Part 2-7: Reinforced base materials clad and unclad - Epoxide woven E-glass laminated sheet of defined flammability (vertical burning test), copper-clad*

ISO 3:1973, *Preferred numbers – Series of preferred numbers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Clause 3 of IEC 60127-1, together with the following definitions, apply.

3.1

through-hole fuse-link

UMF designed for soldering directly into a printed wiring board, with insertion of its leads in suitably designed holes

3.2

surface mount fuse-link

UMF designed for direct conductive attachment by solder or other means on to the surface of a substrate, without insertion of its leads in suitably designed holes or sockets

3.3

land

portion of a conductive pattern usually but not exclusively used for the connection and/or attachment of components (see IEC 60194)

NOTE Further definitions which may be useful in the application of surface mount fuse-links may be found in IEC 60115-1 and IEC 60115-8³.

4 General requirements

See IEC 60127-1.

5 Standard ratings

5.1 Rated voltage

See standard sheets.

5.2 Rated current

See Table 1 for preferred ratings.

5.3 Rated breaking capacity

See standard sheets.

² There exists a consolidated version (2002).

³ This standard has been withdrawn.

6 Marking

In addition to the requirements of Clause 6 in IEC 60127-1, the following criteria concerning UMF shall be observed and marked:

6.1 Addition:

- e) For fuse-links rated at 250 V, a symbol denoting the breaking capacity. This symbol shall be placed between the marking for rated current and the marking for rated voltage.

These symbols are as follows:

H: denoting high-breaking capacity;

I: denoting intermediate-breaking capacity;

L: denoting low-breaking capacity.

- f) The distinctive symbol shown in Figure 1.
- g) The letters a.c. before the voltage for devices designed solely for alternating current application.

6.4 Colour coding for universal modular fuse-links

Under consideration.

6.5 Where marking is impractical due to space limitations, the relevant information should appear on the smallest package and in the manufacturer's technical literature.

7 General notes on tests

In addition to the requirements of Clause 7 in IEC 60127-1, the following criteria shall be observed:

7.2 Addition:

7.2.1 For testing of individual fuse ratings according to standard sheets 1 and 2, see Table 2. For fuse-links designed and rated both for a.c. and d.c., the number of fuse-links required is 63. For fuse-links designed only for a.c., the number of fuse-links required is 48. There are nine spares.

For the maximum ampere rating of a homogeneous series according to standard sheets 1 and 2, see Table 3. For fuse-links designed and rated both for a.c. and d.c., the number of fuse-links required is 53. For fuse-links designed only for a.c., the number of fuse-links required is 48. There are 19 spares.

For the minimum ampere rating of a homogeneous series according to standard sheets 1 and 2, see Table 4. For fuse-links designed and rated both for a.c. and d.c., the number of fuse-links required is 38. For fuse-links designed only for a.c., the number of fuse-links required is 33. There are 16 spares.

7.3 Fuse-bases for tests

7.3.1 General requirements

Fuse-links shall be mounted upon the appropriate test board (see 7.3.2 or 7.3.3 as appropriate) by soldering.

This test board shall then be mounted on the test fuse-base (Figure 4). The test board shall be made of epoxide woven glass fabric copper-clad laminated sheet, as defined in IEC 61249-2-7:

– the nominal sheet thickness shall be 1,6 mm;

[A] – the nominal thickness of copper layer shall be 0,035 mm (0.070 mm for rated currents above 5 A). **[A]**

Metal parts of the fuse-base shall be made of brass with a copper content between 58 % and 70 %. Contact parts shall be silver-plated.

When two or more fuse-links are tested in series, the test fuse-bases shall be located so that there will be a spacing of not less than 50 mm between any two fuse-links under test. The conductor connecting the test fuse-bases together, and connecting the test fuse-bases to the ammeter and the source of supply shall be insulated copper wire. The length of each conductor shall be 250 mm, and the cross-sectional area of the wire shall be approximately 1 mm².

7.3.2 Through-hole fuse-links (standard sheet 1)

For electrical tests upon fuse-links covered by standard sheet 1, the fuse-link shall be mounted on the test board, as shown in Figure 2 in the pair of holes appropriate to the spacing of the terminations.

7.3.3 Surface mount fuse-links (standard sheet 2)

For electrical tests upon fuse-links covered by standard sheet 2, the fuse-link shall be mounted on the test board, as shown in Figure 3. See Annex A for guidance.

8 Dimensions and construction

8.1 Dimensions

The dimensions of the UMFs shall comply with the relevant standard sheets.

Compliance is checked by measurement of length, width and height.

For fuse-links to standard sheet 1, the termination spacing is checked. The termination shall also pass through a 1 mm hole. The length of the termination is not specified as this is subject to the method of packaging.

8.2 Construction

The fuse-element shall be completely enclosed.

The UMF shall withstand the heat and chemical exposure of a printed circuit board or other substrate assembly operations with its performance unimpaired.

Compliance is checked by the resistance to soldering heat test as specified in 8.7.