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Interested committees:

Title: BS EN IEC 60127-4 Miniature fuses

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

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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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.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
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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.	



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2023-11-10

CLOSING DATE FOR COMMENTS:

2024-02-02

SUPERSEDES DOCUMENTS:

32C/627/RR

IEC SC 32C : MINIATURE FUSES

SECRETARIAT:

China

SECRETARY:

Mr Jun Cai

OF INTEREST TO THE FOLLOWING COMMITTEES:

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:

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

NOTE FROM TC/SC OFFICERS:

The texts in red indicate the change compared to the existing IEC 60127-4 Ed3.2.

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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.

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 60068-2-21:1999, *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 60127-1:2023, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*

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

IEC 60664-1:2023, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

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 60115-8¹.

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.

¹ 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.

96 7.3 Fuse-bases for tests

97 7.3.1 General requirements

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

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

- 102 – the nominal sheet thickness shall be 1,6 mm;
- 103 – the nominal thickness of copper layer shall be 0,035 mm
- 104 – The manufacturer must indicate the used parameters and provide finished PCBs for the
105 tests for rated currents above 5 A. See Table 6.

106 Metal parts of the fuse-base shall be made of brass with a copper content between 58 % and
107 70 %. Contact parts shall be silver-plated.

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

113 For rated currents above 5 A the length of each conductor shall be at least 500 mm, and the
114 cross-sectional area of the wire shall be according to Table 17. The cables must be black.

115 Table 17 – Cross-sections of conductors (Taken and extended from IEC 60127-6)

Rated fuse current [A]	Copper conductor cross section [mm ²]
Up to and including 5	1
More than 5, and up to and including 10	1.5
More than 10, and up to and including 16	2.5
More than 16, and up to and including 25	4
More than 25, and up to and including 35	6
More than 35, and up to and including 60	35 (to be defined)
More than 60, and up to and including 100	50 (to be defined)

116 7.3.2 Through-hole fuse-links (standard sheet 1)

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

120 7.3.3 Surface mount fuse-links (standard sheet 2)

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

123 **8 Dimensions and construction**

124 **8.1 Dimensions**

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

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

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

130 **8.2 Construction**

131 The fuse-element shall be completely enclosed.

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

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

135

8.3 Terminations

8.3.1 Through-hole fuse-links

Terminations shall be firmly attached so that it is not possible to remove them without damaging the UMF.

Compliance is checked by carrying out the following test.

The samples are preconditioned by immersion in water for 24 h at a temperature between 15 °C and 35 °C.

The tests are carried out in accordance with IEC 60068-2-21.

The following tests shall be applied:

- tensile test U_{a1} , applied force 10 N;
- thrust test U_{a2} , applied force 2 N;
- bending test U_b , applied force 5 N, number of bends: 1.

The sample size is two fuses for each test. After testing, the terminations shall remain firmly attached. The voltage drop shall be measured in accordance with 9.1, and shall not exceed the maximum allowed in Table 1. Bending test U_b is omitted if the terminations are less than 5 mm.

8.3.2 Surface mount fuse-links

The fuse-links shall be mounted on the test board as shown in Figure 3. The test board, with the fuse-links on the underside, shall be placed in the bending jig as shown in Figure 5. The board shall then be bent by 1 mm at a rate of 1 mm/s. The test board shall be allowed to recover from the bent position, and then be removed from the test jig.

After the test, the terminations shall remain firmly attached, and the voltage drop shall be measured in accordance with 9.1, and shall not exceed the maximum allowed in Table 1.

8.4 Alignment and configuration of terminations

The termination configuration and spacing shall be as specified in the standard sheets.

NOTE 1 Through-hole fuse-links

For through-hole mounting of UMFs (standard sheet 1), the dimensions shown on the standard sheets are such as to permit installation on printed circuit boards having a grid system of holes located on centres of distance $e = 2,5$ mm. Attention is drawn to the fact that in some parts of the world the value $e = 2,54$ mm is still in use by printed circuit designers.

Electrical and electronic circuit designers are advised to apply the requirements of IEC 60326-3.

NOTE 2 Surface mount fuse-links

For surface mounting of UMFs (standard sheet 2), electrical and electronic circuit designers are advised to design substrate land areas to receive UMFs with due consideration for achieving the maximum area of contact in the application, taking into account the tolerance applied to mechanical placing of the component and the dimensions and tolerances for terminals in this standard.

8.5 Soldered joints

See IEC 60127-1.