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INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Low-voltage fuses – Part 1: General requirements

Fusibles basse tension – Partie 1: Exigences générales

IEC 60269-1:2006/A1:2009

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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FOREWORD

This amendment has been prepared by subcommittee 32B: Low-voltage fuses, of IEC technical committee 32: Fuses.

The text of this amendment is based on the following documents:

FDIS	Report on voting
32B/534/FDIS	32B/540/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result 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- withdrawn,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.

1.2 Normative references

Replace "IEC 60695-2-1/0:1994" *by* "IEC 60695-2-10:2000".

Replace "IEC 60695-2-1/1:1994" *by* "IEC 60695-2-11:2000".

Replace "IEC 60695-2-1/2:1994" *by* "IEC 60695-2-12:2000".

Replace "IEC 60695-2-1/3:1994" *by* "IEC 60695-2-13:2000".

Add the following new definition:

2.1.12
linked fuse-carrier
a fuse-carrier which is mechanically linked to the fuse-base and gives a defined insertion and withdrawal movement to the fuse-link

[This definition was definition 2.1.12 in IEC 60269-2-1, Section I, which has been withdrawn.]

Table 2

In the note of Table 2, change "[a] Under consideration*" to* "[a] Values for fuse-links with rated current less than 16 A are given in subsequent parts".

Table 3

In Note a of Table 3, delete "or are under consideration".

6 Markings

Replace the second paragraph and the note by the following:

The marking is rubbed by hand for 5 s with a piece of cloth soaked with water and again for 5 s with a piece of cloth soaked with aliphatic solvent hexane.

NOTE It is recommended to use aliphatic solvent hexane with an aromatic content of maximum 0,1 volume percentage, a kauributanol value of approximately 29, an initial boiling point of approximately 65 °C, a dry point of approximately 69 °C and a density of approximately 0,68 g/cm^3.

7.1.2 Connections, including terminals

Replace the note by the following:

NOTE Requirements of screwless-type terminals are given in Annex E.

7.2 Insulating properties and suitability for isolation

Replace the second sentence of the first paragraph by the following:

The fuse shall be suitable for isolation when it is in its normal open position, the fuse-link remaining inside the fuse-carrier, or when the fuse-link, and, when applicable, the fuse-carrier is removed.

7.4 Operation

In the second and the third paragraph, first dash, replace (2x) "its fuse-element does not melt" *by* "the fuse-link does not operate".

7.9.2 Leakage currents of equipment suitable for isolation

*In the heading replace "*equipment*" by "*fuses*".*

7.9.3 Additional constructional requirements for fuses for non-separable fuse-carriers, suitable for insulation

Modify the title as follows:

7.9.3 Additional constructional requirements for fuses for linked fuse-carriers, suitable for isolation

7.12.1 Resistance to rusting

Replace "8.2.4.2" *by* "8.2.2.3.2".

7.12.2 Resistance to season cracking

Replace "8.2.4.2" *by* "8.2.2.3.2".

8.1.1 Kind of tests

Replace the last paragraph by the following new paragraph:

If any part of the fuse is modified in a manner liable to adversely affect the result of a type test already performed, that type test shall be repeated.

8.1.5.2 Testing of fuse-links of a homogeneous series

This change applies to the French text only.

Table 11

*In Note a) of Table 11, replace "*time current*" by "*time-current*".*

Table 12

In the line for 8.11.1, replace "Mechanical strength [d)]" *by* "Mechanical strength [b)]".

Table 13

Replace Table 13 by the following new Table 13:

Test according to subclause		Number of samples										
		"g" fuse-links								"a" fuse-links		
		1	1	1	1	1	1	1	1	1	2	2
8.1.4	Dimensions	X		X						X		X
8.1.5.1	Resistance	X	X	X	X	X	X	X	X	X	X	X
8.4.3.1 a)	Conventional non-fusing current		X									
8.4.3.2	Rated current	X										
8.4.3.3.1	Time-current characteristics no. 4a [a)]			X						X		
8.4.3.3.2	Gates, "g" fuse-links a) I_{min} (10 s)					X						
	b) I_{max} (5 s)						X					
	c) I_{min} (0,1 s)							X				
	d) I_{max} (0,1 s)								X			
	Gates, "a" fuse-links										X	X
8.4.3.5	Conventional cable overload protection test				X							
[a)] With the exception of "gD", "gG" and "gM", as adequate tests are carried out in connection with verification of the gates (see 8.4.3.3.2).												
NOTE The tests according to Table 13 may be performed at reduced voltages.												

Table 14

In the line for 8.2, replace "Insulating properties" *by* "Insulating properties and suitability for isolation".

8.2.1 Arrangement of the fuse-holder

Replace the last paragraph by the following:

For the verification of the suitability of the fuse for isolation, it shall be in its normal open position, the fuse-link remaining inside the fuse-carrier, or the fuse-link, and, when applicable, the fuse-carrier shall be removed.

8.2.2.2 Value of test voltage

Replace the existing text with the following new text:

The values of test voltage are shown in Table 15 as a function of the rated voltage of the fuse-holder.

8.2.3 Verification of the suitability for isolation

Replace the existing text with the following new text:

Clearances and creepage distances shall be verified by dimensional measurement and by voltage test.

8.4.3.5 **Conventional cable overload protection** (for "gG" fuse-links only)

Change the title to

8.4.3.5 **Conventional cable overload protection test** (for "gG" fuse-links only)

Place the last paragraph after the note.

Table 20

Change the note for k_2 to

k_2: see Figures 2 and 3.

Table 21 – Values of breaking capacity tests on d.c. fuses

Replace the value for the time constant by the following:

If the prospective current is higher than 20 kA:
15 ms to 20 ms

If the prospective current is equal to or less than 20 kA:
0,5 $(I)^{0,3}$ with a tolerance of $^{+20}_{0}$% [b] (value I in A).

8.11.2.2.5 Severities

In the Note replace "IEC 60695-2-1" *by* "IEC 60695-2-10 to 13".

Figure 3 – Time current zone for aM fuses

Replace "Time current" *by* "Time-current".

Figure 8 – Glow-wire and position of the thermocouple

Add to the drawing “Dimensions in millimetres”.

B.2 Calculation of the value of pre-arcing I^2t under the conditions of test no. 2

In the formula replace “$(I_2t)_1$” *by* “$(I^2t)_1$".

Add the following new Annex E:

Annex E
(normative)

Particular requirements for fuse-bases with screwless-type terminals for external copper conductors

E.1 Scope

This annex applies to fuse-bases that fall within the scope of Subclause 1.1, feature screwless-type terminals supporting a maximum current of 63 A, and are primarily intended for the purpose of connecting unprepared copper conductors (see E.2.6) with a cross-section of up to 16 mm^2.

For the purpose of this annex, screwless-type terminals shall be referred to as terminals and copper conductors as conductors.

E.2 Terms and definitions

In addition to Clause 2, the following definitions apply:

E.2.1
clamping unit
part(s) of the terminal necessary for mechanical clamping and electrical connection of the conductors including the part(s) which are necessary to ensure correct contact pressure

E.2.2
screwless-type terminal
terminal for the connecting and subsequent disconnection of one conductor per clamping unit obtained directly or indirectly by means of springs, wedges or the like

NOTE Examples are given in Figure E.2.

E.2.3
universal terminal
terminal for the connection and disconnection of all types of conductors (rigid and flexible)

E.2.4
non-universal terminal
terminal for the connection and disconnection of a certain kind of conductor only (e.g. rigid-solid conductors only or rigid-(solid and stranded) conductors only)

E.2.5
push-wire terminal
non-universal terminal in which the connection is made by pushing-in rigid (solid or stranded) conductors

E.2.6
unprepared conductor
conductor which has been cut and the insulation of which has been removed over a certain length for insertion into a terminal

NOTE 1 A conductor the shape of which is arranged for introduction into a terminal or of which the strands may be twisted to consolidate the end, is considered to be an unprepared conductor.

NOTE 2 The term "unprepared conductor" means conductor not prepared by soldering of the wire, use of cable lugs, formation of eyelets, etc., but includes its reshaping before introduction into the terminal or, in the case of flexible conductor, by twisting it to consolidate the end.

E.6 Marking

In addition to Clause 6, the following requirements apply:

- universal terminals:
  - no marking.
- non-universal terminals:
  - terminals declared for rigid-solid conductors shall be marked by the letters "s" or "sol";
  - terminals declared for rigid (solid and stranded) conductors shall be marked by the letter "r";
  - terminals declared for flexible conductors shall be marked by the letter "f".

The markings should appear on the fuse-base or on the smallest package or in the technical information.

An appropriate marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shall be shown on the fuse-base . The manufacturer shall also provide information, in his literature, on the maximum number of conductors which may be clamped.

E.7 Standard conditions for construction

Clause 7 applies, with the following modifications.

E.7.1 Fixed connections including terminals

Terminals shall resist the mechanical loads that occur when the equipment is used in accordance with its intended purpose. The connection or disconnection of conductors shall be made

– by the use of a general purpose tool or by a convenient device integral with the terminal to open it and to assist the insertion or the withdrawal of the conductors (e.g. for universal terminals)

or for rigid conductors

– by simple insertion. For disconnection of the conductors an operation other than a pull only on the conductor shall be necessary.

Universal terminals shall accept rigid (solid or stranded) and flexible unprepared conductors.

Non-universal terminals shall accept the types of conductors declared by the manufacturer.

Compliance is checked by inspection and by the tests of E.8.1 and E.8.2.

E.7.2 Dimensions of connectable conductors

The dimensions of connectable conductors are given in Table E.1.

The ability to connect these conductors shall be checked by inspection and by the tests of E.8.1 and E.8.2.

Table E.1 – Connectable conductors

Connectable conductors and their theoretical diameter				
Metric				
Rigid			Flexible	
	Solid	Stranded		
mm^2	∅ mm	∅ mm	mm^2	∅ mm
1,5	1,5	1,7	1,5	1,8
2,5	1,9	2,2	2,5	2,3
4,0	2,4	2,7	4,0	2,9
			6,0	3,9
			10	5,1
			16	6,3
NOTE Diameters of the largest rigid and flexible conductors are based on Table 1 of IEC 60228 (2004).				

E.7.3 Connectable cross-sectional areas

The nominal cross-sections to be clamped are defined in Table E.2.

Table E.2 – Cross-sections of copper conductors connectable to terminals

Rated current A	Nominal cross-sections to be clamped mm^2
Up to and including 16	1,5, up to and including 4
Above 16, up to and including 32	4, up to and including 10
Above 32, up to and including 63	6, up to and including 16

Compliance is checked by inspection and by the tests of E.8.1 and E.8.2.

E.7.4 Insertion and disconnecting of conductors

The insertion and disconnecting of conductors shall be made in accordance with the manufacturer's instructions.

Compliance is checked by inspection.

E.7.5 Design and construction of terminals

Terminals shall be designed and constructed so that

– each conductor is clamped individually;

– during operation of connection or disconnection the conductors can be connected or disconnected either at the same time or separately;

– inadequate insertion of the conductor is avoided.

It shall be possible to clamp securely any number of conductors up to the maximum provided for.