



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 60269-7:2021**  
**01-september-2021**

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**Niskonapetostne varovalke - 7. del: Taljivi vložki za zaščito baterij**

Low-voltage fuses - Part 7: Fuse links for the protection of batteries

Fusibles basse tension - Partie 7: Exigences supplémentaires concernant les éléments de remplacement utilisés pour la protection des batteries et des systèmes de batterie

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**Ta slovenski standard je istoveten z: prEN IEC 60269-7:2021**

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**ICS:**

29.120.50	Varovalke in druga nadtokovna zaščita	Fuses and other overcurrent protection devices
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# 32B/700/CDV

## COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

**IEC 60269-7 ED1**

DATE OF CIRCULATION:

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CLOSING DATE FOR VOTING:

**2021-09-03**

SUPERSEDES DOCUMENTS:

**32B/695/CD, 32B/696A/CC**

IEC SC 32B : LOW-VOLTAGE FUSES	
SECRETARIAT: Germany	SECRETARY: Mr Michael Altenhuber
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 21, SC 32A, TC 64, TC 120	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
<p><b>Attention IEC-CENELEC parallel voting</b></p> <p>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

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TITLE:

**Low-voltage fuses - Part 7: Fuse links for the protection of batteries**

PROPOSED STABILITY DATE: 2024

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**LOW VOLTAGE FUSES****Part 7: Supplementary Requirements for fuse-links for the protection of batteries and battery systems****FOREWORD**

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**International Standard IEC 60269-7 has been prepared by subcommittee 32B: Low-voltage fuses, of IEC technical committee 32: Fuses.**

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

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

This part is to be used in conjunction with IEC 60269-1, Low-voltage fuses, Part 1: General requirements.

This Part 7 supplements or modifies the corresponding clauses or subclauses of Part 1. Where no change is necessary, this Part 7 indicates that the relevant clause or subclause of Part 1 applies.

Tables and figures which are additional to those in Part 1 are numbered starting from 101. Additional annexes are lettered AA, BB, etc.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2. A list of all parts of the IEC 60269 series, under the general title: *Low-voltage fuses*, can be found on the IEC website.

The committee has decided that the contents of this publication 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

- 65
- 66
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- 69
- reconfirmed;
  - withdrawn;
  - replaced by a revised edition, or
  - amended

70 The standard specifically supports the UN goals

71 Nr. 7: affordable and clean energy

72 Nr. 9: Industry, innovation and infrastructure

73 Nr. 11: Sustainable cities and communities

74 Nr. 12: Responsible consumption and communities

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## 76 1 General

77

78 Fuse-links for the protection of battery energy systems shall comply with all  
79 requirements of IEC 60269-1, if not otherwise indicated hereinafter, and shall also comply  
80 with the supplementary requirements laid down below.

81

### 82 1.1 Scope and object

83 These supplementary requirements apply to fuse-links for the protection of batteries and battery  
84 systems, including, but not limited to terminology, for electricity storage in equipment for circuits of  
85 nominal voltages up to 1 500 V d.c.

86 Their rated voltage may be higher than 1 500 V d.c.

87

88 The object of these supplementary requirements is to establish the characteristics of Battery fuse-  
89 links in such a way that they can be replaced by other fuse-links having the same characteristics,  
90 provided that their dimensions are identical.

91

### 92 1.2 Normative references

93

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

97

98 IEC 60269-1: *Low-voltage fuses – Part 1: General requirements*<sup>1</sup>

99

100 IEC 60269-2: *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by*  
101 *authorized persons (fuses mainly for industrial application) – Examples of standardized*  
102 *systems of fuses A to K*

103

104 IEC 60364-4-41: *Low-voltage electrical installations – Part 4-41: Protection for safety –Protection*  
105 *against electric shock*

106

107 IEC 60364-4-43: *Low-voltage electrical installations – Part 4-43: Protection for safety –Protection*  
108 *against overcurrent*

109

110 IEC 60086-4/Ed5: Primary batteries - Part 4: Safety of lithium batteries

111

112 IEC 62932-1: Flow battery systems for stationary applications – Part 1: General Aspects, Terminology  
113 and Definitions

114

115 IEC 62485-5: *Safety requirements for secondary batteries and battery installations – Part 5: Safe*  
116 *operation of stationary lithium-ion batteries in applications*

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118 IEC 62485-6: Safety requirements for secondary batteries and battery installations – Part 5: Safe  
119 operation of lithium-ion batteries in traction applications

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121 IEC 62660-4 TR: Candidate alternative test methods for the internal short circuit test of IEC 62660-3

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123 ISO 3, *Preferred numbers – Series of preferred numbers*

124  
125 IEC 60504 : IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and  
126 Components (IECEE System), Committee of Testing Laboratories (CTL), Instrument Accuracy Limits

127  
128 ISO/IEC 17025 : General requirements for the competence of testing and calibration laboratories

## 129 **2 Terms and definitions**

130  
131  
132 For the purposes of this document, the terms and definitions given in IEC 60269-1 as well as  
133 the following applies.

### 134 **2.1 General terms**

#### 135 **2.1.101 battery** (IEV 482-01-04)

136  
137 one or more cells fitted with devices necessary for use. For example case, terminals, markings and  
138 protective devices etc., as necessary for use

#### 139 **2.1.102 cell** (IEV 482-01-01)

140  
141 basic functional unit, consisting of an assembly of electrodes, electrolyte, container, terminals and  
142 usually separators, that is a source of electric energy obtained by direct conversion of chemical  
143 energy

#### 144 **2.1.103 battery module**

145  
146 group of cells connected together, either in a series and/or parallel configuration with or without protective  
147 devices (e.g. fuse or PTC: Positive Temperature Coefficient) and monitoring circuitry

#### 148 **2.1.104 battery system**

149  
150 battery system which incorporates one or more cells, modules or battery packs including associated devices.  
151

152  
153 NOTE - It has battery management unit to cut off in case of overcharging, over current, and overheating. It may have cooling or heating  
154 units.  
155

#### 156 **2.1.105 rated energy**

157  
158 quantity of energy, declared by the manufacturer, which under the specified conditions can be discharged from  
159 fully charged flow battery energy storage system, to fully discharge

160 Note 1 to entry:: The rated energy is expressed in watt hour (Wh).  
161

#### 162 **2.1.106 rated output power**

163  
164 electrical power, declared by the manufacturer, which under the specified operating conditions is the maximum  
165 output power designed to achieve

166 Note 1 to entry: The rated output power is normally expressed in watt (W).  
167

#### 168 **2.1.107 short-circuit current** (IEV 482-03-26)

169  
170 maximum current which can be delivered by a cell or battery into an external circuit with zero electric  
171 resistance, or an external circuit which depresses the cell or battery voltage to approximately zero volts

#### 172 **2.1.108 open circuit voltage OCV, , off-load voltage $U_{oc}$** (IEV 482-03-32)

173  
174 voltage across the terminals of a cell or battery when no external current is flowing

#### 175 **2.1.109 overcurrent protective device** (IEV 482-03-32)

176  
177 Device provided to interrupt an electrical circuit in case the conductor current in the electrical circuit  
exceeds a predetermined value for a specified duration.

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### 2.1.110 rated capacity (IEV 482-03-15)

capacity value of a cell or battery determined under specified conditions and declared by the manufacturer

## 3 Conditions for operation in service

### 3.4 Voltage

The d.c. system voltage has a maximum value not exceeding 100% of the rated voltage of the fuse.

#### 3.4.1 Rated voltage

The rated d.c. voltage of a fuse-link shall exceed the maximum value of the open circuit voltage of the Battery (OCV,  $U_{oc}$ , off-load voltage) or of the network. See Annex AA.

### 3.5 Current

#### 3.5.1 Rated Current

Rated currents are given in paragraph 5.3. These values depend upon the utilization categories and rated voltages. For specific systems and sizes, see appendix AA

### 3.6 Frequency, power factor and time constant

#### 3.6.1 Frequency

Not applicable

#### 3.6.2 Power factor

Not applicable

#### 3.6.3 Time constant

The time constants expected in practice are considered to correspond to those in Table 105 respectively 106.

### 3.10 Temperature inside an enclosure

Since the rated values of the fuse-links are based on specified conditions they do not always correspond to those prevailing at the point of installation, including the local air conditions, the user may have to consult the manufacturer to define allowable continuous current under these specific conditions.

## 5 Characteristics of fuses

### 5.1 Summary of characteristics

#### 5.1.2 Fuse-links

- a) Rated voltage (see 5.2)
- b) Rated current (see 5.3 of IEC 60269-1)
- c) Rated power dissipation (see 5.5)
- d) Time-current characteristics (see 5.6)
- e) Breaking range and utilization category (see 5.7.1)
- f) Rated breaking capacity (see 5.7.2)
- g) Dimensions or size (if applicable)

#### 5.2 Rated voltage

Table 22 of IEC 60269-1 applies; If it is necessary to choose lower values or intermediate values or

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[https://standards.iteh.ai/catalog/standards/sist/a1cfc08-4c78-4fa9-b1d5-](https://standards.iteh.ai/catalog/standards/sist/a1cfc08-4c78-4fa9-b1d5-3c1f2e1c1c1c/iec-60269-7-2021)

237 higher values, these values should be selected from the series R10 of ISO 3, and in exceptional  
238 cases, from R20 or R40 of ISO 3.

### 239 5.3 Rated current

240 IEC 60269-1 part 5.3.1. applies with the addition of the following rated currents: 1400 – 1600 – 1800 -  
241 2000 – 2250 – 2800 – 3150 – 3600 – 4000 – 4500 - 5000.

### 242 5.5 Rated power dissipation of the fuse-link

243 In addition to the requirements of IEC 60269-1, the manufacturer shall indicate the power  
244 dissipation as a function of current for the range contained between 50 % to 100 % of the  
245 rated current, or publish the load profile.

246 Derating-curve for increased ambient temperature has to be given in the manufacturer's literature.  
247

### 248 5.6 Limits of time-current characteristics

#### 249 5.6.1 Time-current characteristics, time-current zones

250 The manufacturer shall provide mean time-current characteristics.

251 The time/current curve should be plotted for d.c. with a time constant defined by the manufacturer  
252 within the limits of Table 104 and 105.

253 Time current zone shall be available in the manufacturer's literature for times greater than 0,001s.  
254 greater than 0,001s for aBat fuses and greater than 0,01s for gBat

#### 255 5.6.2 Conventional times and currents

##### 256 5.6.2.2 Conventional times and currents for "gBat" - fuse-links

257 The conventional times and currents are given in Table 101.

##### 258 5.6.2.3 Conventional times and currents for "aBat" - fuse-links

259 Minimum Breaking Current for "aBat": 10 times rated current unless a different value is stated by the  
260 manufacturer in its literature. Conventional times are given in Table 101.

261 **Table 101 – Conventional times and currents for "gBat" fuse-links**

262 <https://standards.iteh.ai/catalog/standards/sist/a1cfc08-4c78-4fa9-b1d5-5d5ee4739ad1/osist-pr-en-iec-60269-7-2021>

Rated current A	Conventional time h	Conventional current	
		Type "gBat"	
		$I_{nr}$	$I_r$
$I_n \leq 63$	1	1,13 $I_n$	1,60 $I_n$
$63 < I_n \leq 160$	2		
$160 < I_n \leq 400$	3		
$I_n > 400$	4		

271

#### 272 5.6.3 Gates

273

274 Due to different battery technologies, gates are to be agreed between the manufacturer and the user.

275

### 276 5.7 Breaking range and breaking capacity

277

278 IEC60269-1 applies with the following supplementary requirement.

279

#### 280 5.7.1 Breaking range and utilization category

281

282 Additionally to Part 1:

283 "gBat" indicates fuse-links with a full-range d.c. breaking capacity for the protection of batteries and battery  
284 systems

285 "aBat" indicates fuse-links with a partial range d.c. breaking capacity for the protection of batteries and battery  
286 systems



287 Note: "Bat" (for battery) indicates fuse-links with d.c. breaking capacity for battery energy systems.  
 288 These letters define with accuracy the time-current characteristics, conventional  
 289 times and currents, gates.  
 290

### 291 5.7.2 Rated breaking capacity

292 Minimum value of rated breaking capacity required by this part is 30 kA. Higher breaking capacities are  
 293 permissible.  
 294

## 295 6 Markings

296 IEC 60269-1 applies with the following supplementary requirements.  
 297

### 298 6.2 Markings on fuse-links

299 Subclause 6.2 of IEC 60269-1 applies with the following addition:  
 300

- 301 – utilization category "gBat" or "aBat"
- 302 – rated breaking capacity
- 303 – a combination of symbols of IEC 60417 of a fuse (5016) and a battery (5001A) as shown below



## 304 7 Standard conditions for construction

305 IEC 60269-1 applies with the following supplementary requirements.  
 306

### 307 7.3 Temperature rise and power dissipation of the fuse-link

308 Fuse-links shall be so designed and proportioned as to carry, when tested in accordance with 8.3, the rated  
 309 current without exceeding  
 310

- 311 – the temperature rise limit of the hottest upper metal part of the fuse-link indicated by the manufacturer  
 (see Figures 102 and 103)
- 312 – the power dissipation at the rated current indicated by the manufacturer

## 313 7.4 Operation

314 The fuse-link shall be so designed and proportioned as to carry continuously any value of  
 315 current up to its rated current.  
 316

317 "aBat" fuse-links shall operate and break the circuit for any current value not exceeding the  
 318 rated breaking capacity and not less than a current sufficient to interrupt the fuse-link  
 319 specified by the manufacturer.  
 320

321 For "gBat" fuse-links within the conventional time:

- 322 – its fuse-element does not operate, when it carries any current not exceeding the  
 323 conventional non-fusing current ( $I_{nf}$ )
- 324 – it operates when it carries any current equal to, or exceeding, the conventional fusing  
 325 current ( $I_f$ ) and equal to or lower than the rated breaking capacity

326 This applies for conditions stated under Paragraph 8.3 and 8.4.  
 327

## 328 7.5 Breaking capacity

329 A fuse-link of the utilization category "gBat" shall be capable of breaking, at rated d.c. voltage, any  
 330 circuit having a prospective current between the value as in Test No.5 in table 104 and the rated  
 331 breaking capacity.  
 332

333

345 A fuse-link of the utilization category "aBat" shall be capable of breaking, at rated d.c. voltage, any  
 346 circuit having a prospective current between the value of  $I_{2a}$  in table 105 and the rated breaking  
 347 capacity.  
 348

## 349 8 Tests

350 IEC 60269-1 applies with the following supplementary requirements.

### 351 8.1 General

352 Measurement uncertainty information of tests is given in ISO/IEC 17025 and in IEC 605014  
 353

#### 354 8.1.4 Arrangement of the fuse and dimensions

355  
 356 The fuse-link shall be mounted open in surroundings free from draughts and, unless otherwise  
 357 specified, in a vertical position (see 8.3.1).

#### 362 8.1.5 Testing of fuse-links

##### 363 8.1.5.1 Complete tests

364 A survey of the complete tests is given in Table 102 and 103.

##### 365 8.1.5.2 Type test exemptions for fuse-links of a homogeneous series

366  
 367 Fuse-links having intermediate values of rated current of a homogeneous series are exempted  
 368 from a number of type tests if the fuse-link of the largest rated current has been tested according to  
 369 Table 102 and if the fuse-link of the smallest rated current has been tested according to Table 103.  
 370

371  
 372  
 373  
 374  
 Table 102 - Survey of complete tests on fuse-links and number of fuse-links to be tested

Test according to subclause		"g"- fuse-link					"a"- fuse-link					
		1	1	1	3	3	1	1	1	3	3	1
Number of fuse-links to be tested		1	1	1	3	3	1	1	1	3	3	1
8.1.4	Dimensions	X						X				
8.1.5.1	Resistance	X	X	X	X	X	X	X	X	X	X	X
8.3.3	Temperature rise and power dissipation	X						X				
8.4.3.1	Conventional non-fusing current ( $I_{nf}$ )		X									
8.4.3.1	Conventional fusing current ( $I_f$ )		X									
8.4.3.2	Verification of rated current			X				X				
8.4.3.6	Operation of indicating devices and strikers, if any				X	X	X			X	X	X
8.5	No. 1 Breaking capacity and operating characteristics				X					X		
	No. 2 Breaking capacity and operating characteristics					X					X	
	No. 2a Breaking capacity and operating characteristics											X
	No. 5 Breaking capacity and operating characteristics						X					

375 Table 103 - Survey of tests on fuse-links of the smallest rated current of a homogeneous series