

# Low-voltage fuses —

**Part 2: Supplementary requirements  
for fuses for use by authorized  
persons (fuses mainly for industrial  
application) — Examples of  
standardized systems of fuses A to I**

ICS 29.120.50

National foreword

This British Standard is the UK implementation of HD 60269-2:2007. It is derived from but not identical with IEC 60269-2:2007. It supersedes BS 88-2.2:1988, BS 88-5:1988 and BS 88-6:1988 which will be withdrawn on 1 March 2010. Together with BS 88-1:2007 it supersedes BS EN 60269-2:1995 which will be withdrawn on 1 March 2010.

This standard is part of a restructured series of British Standards for Low Voltage Fuses. These cover the related parts and examples of systems of fuses given in the associated IEC 60269:2006 series of standards.

These British Standards together with their IEC counterparts are:

BS 88-1:2007 — *General requirements* (IEC 60269-1)

BS 88-2:2007 — *Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)* (IEC 60269-2, Fuse systems E, G and I)

BS 88-3:2007 — *Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)* (IEC 60269-3, Fuse system C)

BS 88-4:2007 — *Supplementary requirements for fuse-links for the protection of semiconductor devices* (IEC 60269-4)

This standard covers the following British Fuse systems that are included in HD 60269-2:2007:

Fuse system E — Fuses with fuse-links for bolted connections (BS bolted fuse system)

Fuse system G — Fuses with fuse-links with offset blade contacts (BS clip-in fuse system)

Fuse system I — gU fuse-links with wedge tightening contacts

The text for BS 88-2:2007 has been extracted from IEC 60269-2:2006 and is identical to the text for sections E, G, and I. However, wherever a reference is made to IEC 60269-1 in the text this should be taken as a reference to BS 88-1 (BS EN 60269-1).

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

A list of organizations represented on PEL/32 can be obtained on request to its secretary.

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

**Compliance with a British Standard cannot confer immunity from legal obligations.**

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English version

**Low-voltage fuses -  
Part 2: Supplementary requirements for fuses for use  
by authorized persons (fuses mainly for industrial application) -  
Examples of standardized systems of fuses A to I  
(IEC 60269-2:2006, modified)**

Fusibles basse tension -  
Partie 2: Exigences supplémentaires  
pour les fusibles destinés à être utilisés  
par des personnes habilitées (fusibles  
pour usages essentiellement industriels) -  
Exemples de systèmes de fusibles  
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Niederspannungssicherungen -  
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an Sicherungen zum Gebrauch durch  
Elektrofachkräfte bzw. elektronisch  
unterwiesene Personen (Sicherungen  
überwiegend für den industriellen  
Gebrauch) -  
Beispiele für genormte  
Sicherungssysteme A bis I  
(IEC 60269-2:2006, modifiziert)

This Harmonization Document was approved by CENELEC on 2007-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document at national level.

Up-to-date lists and bibliographical references concerning such national implementations may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

The text of document 32B/487/FDIS, future edition 3 of IEC 60269-2, prepared by SC 32B, Low-voltage fuses, of IEC TC 32, Fuses, was submitted to the IEC-CENELEC parallel vote.

A draft amendment, containing common modifications to document 32B/487/FDIS that are technically identical to the common modifications in HD 60269-2-1:2005, was prepared by Reporting Secretariat CLC/SR 32B, Low-voltage fuses, and was submitted to the formal vote.

The combined texts were approved by CENELEC as HD 60269-2 on 2007-03-01.

This Harmonization Document partially supersedes EN 60269-2:1995 + A1:1998 + A2:2002 and also supersedes HD 60269-2-1:2005.

This document is to be used in conjunction with EN 60269-1:2007.

This Part 2 supplements or modifies the corresponding clauses or subclauses of Part 1.

Where no change is necessary, this Part 2 indicates that the relevant clause or subclause applies.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2008-03-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2010-03-01

Tables and figures which are additional to those in Part 1 are numbered starting from 101.

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 60269-2:2006 was approved by CENELEC as a Harmonization Document with agreed common modifications.

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**60269-2**

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## Low-voltage fuses –

### Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to I

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



Reference number  
IEC 60269-2:2006(E)

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## **Fuse system E – Fuses with fuse-links for bolted connections (BS bolted fuse system)**

*Remark: previously this system was described in Section II of IEC 60269-2-1*

### **1 General**

IEC 60269-1 applies with the following supplementary requirements.

#### **1.1 Scope**

The following additional requirements apply to fuses with fuse-links having bolted connections. Such fuses have rated currents up to and including 1 250 A and rated voltages up to and including 690 V a.c. and up to and including 500 V d.c.

The following characteristics of the fuses are specified in addition to the IEC 60269-1:

- minimum rated breaking capacities;
- time-current characteristics;
- $I^2t$  characteristics;
- standard conditions of construction;
- power dissipation and acceptable power dissipation.

### **2 Terms and definitions**

IEC 60269-1 applies.

### **3 Conditions for operation in service**

IEC 60269-1 applies.

### **4 Classification**

IEC 60269-1 applies.

### **5 Characteristics of fuses**

IEC 60269-1 applies with the following supplementary requirements.

#### **5.3.1 Rated current of the fuse-link**

The maximum preferred rated currents are given in Figures 501 and 502.

#### **5.3.2 Rated current of the fuse-holder**

The maximum preferred rated currents for the fuse-holder are given in Figure 503.

## 5.5 Rated power dissipation of a fuse-link and rated acceptable power dissipation of a fuse-holder

The maximum values of power dissipation of fuse-links are given in Figure 501.

The values of rated acceptable power dissipation of fuse-holders at rated current when tested in accordance with 8.3.1 are given in Figure 503.

## 5.6 Limits of time-current characteristics

### 5.6.1 Time-current characteristics, time-current zones and overload curves

In addition to the limits of pre-arcing time given by the gates and the conventional times and currents, the time-current zones, excluding manufacturing tolerances, are given in Figures 504 and 505. The tolerance on time-current characteristics shall not deviate by more than  $\pm 10\%$  in terms of current.

### 5.6.2 Conventional times and currents

The conventional times and currents, in addition to the values of IEC 60269-1, are given in Table 501.

**Table 501 – Conventional time and current for "gG" fuse-links**

*Remark: this table refers to Table 2 in IEC 60269-1  
and was previously Table II in IEC 60269-2-1, Section II*

| Rated current $I_n$<br>A | Conventional time<br>h | Conventional current |           |
|--------------------------|------------------------|----------------------|-----------|
|                          |                        | $I_{nf}$             | $I_f$     |
| $I_n < 16$               | 1                      | $1,25 I_n$           | $1,6 I_n$ |

### 5.6.3 Gates

For "gG" fuse-links the gates given in Table 502 and in IEC 60269-1 apply.

**Table 502 – Gates for specified pre-arcing times of "gG" fuse-links**

*Remark: this table refers to Table 3 in IEC 60269-1  
and was previously Table III in IEC 60269-2-1, Section II*

| $I_n$<br>A | $I_{min}$ (10 s)<br>A | $I_{max}$ (5 s)<br>A | $I_{min}$ (0,1 s)<br>A | $I_{max}$ (0,1 s)<br>A |
|------------|-----------------------|----------------------|------------------------|------------------------|
| 2          | 3,4                   | 5,0                  | 4,6                    | 7,5                    |
| 4          | 6,5                   | 10,5                 | 10,0                   | 18,5                   |
| 6          | 10,0                  | 18,0                 | 17,0                   | 35,0                   |
| 10         | 18,0                  | 36,0                 | 35,0                   | 60,0                   |

### 5.7.2 Rated breaking capacity

The rated breaking capacity shall be a minimum of 80 kA a.c. and 40 kA d.c.

## 6 Markings

IEC 60269-1 applies with the following supplementary requirements.

### 6.1 Markings of fuse-holders

In addition to IEC 60269-1, the following marking applies:

- size.

The marking of the rated current and the rated voltage shall be discernible from the front when a fuse-link has not been fitted.

### 6.2 Markings of fuse-links

In addition to IEC 60269-1, the following marking applies:

- size or reference
- rated breaking capacity

## 7 Standard conditions for construction

IEC 60269-1 applies with the following supplementary requirements.

### 7.1 Mechanical design

The dimensions of fuse-links and fuse-bases are given in Figures 501 and 503.

#### 7.1.2 Connections including terminals

Under consideration.

### 7.9 Protection against electric shock

Where standardized fuse-holders according to Figure 503 are used, the degree of protection against electric shock shall be at least IP2X for all three stages.

## 8 Tests

IEC 60269-1 applies with the following supplementary requirements.

### 8.3 Verification of temperature rise and power dissipation

#### 8.3.1 Arrangement of the fuse

The test arrangement for fuse-links is given in Figure 506. The test arrangement shall be mounted vertically.

#### 8.3.3 Measurement of the power dissipation of the fuse-link

The points of measurement of power dissipation are given in Figure 506.

## **8.4 Verification of operation**

### **8.4.1 Arrangement of the fuse**

The test arrangement of the fuse-link is given in Figure 506. The test arrangement shall be mounted vertically.

## **8.5 Verification of breaking capacity**

### **8.5.1 Arrangement of the fuse**

The test arrangement of the fuse-link is given in Figure 507.

### **8.5.8 Acceptability of test results**

The requirements of IEC 60269-1 apply and in addition fuse-links shall operate without the melting of the fine fuse wire and without mechanical damage to the rig.

## **8.9 Verification of resistance to heat**

Fuse-holders fitted with fuse-links having the maximum power dissipation corresponding to the acceptable power dissipation of the fuse-holder shall be cyclically loaded as pre-treatment. The pre-treatment is specified in 8.4.3.2 of IEC 60269-1. After cooling to normal temperature, the breaking capacity shall be tested at  $I_1$  in accordance with 8.5.

Fuse-links containing organic material in the body or filler shall be subjected to the same test as described above. These fuse-links shall interrupt the test currents  $I_1$  and  $I_5$ .

## **8.10 Verification of non-deterioration of contacts**

Subclause 8.10 of IEC 60269-1 applies.

### **8.10.1 Arrangement of the fuse**

Subclause 8.10.1 of IEC 60269-1 applies with the following addition.

The dummy fuse-links shall have dimensions that comply with Figure 501 for those references that are accommodated in the standardized fuse-holders in Figure 503.

The power dissipation of the dummy fuse-links shall be the rated acceptable power dissipation of the fuse-holders given in Figure 503 when tested in the standardized power dissipation test rig given in Figure 506.

The dummy fuse-links shall be so constructed that they do not operate during the passage of the overload current  $I_{nf}$ .

### **8.10.2 Test method**

The following wording is added after the first paragraph of 8.10.2 in IEC 60269-1.

The following test values have to be applied:

Test current: conventional non-fusing current  $I_{nf}$

Load period: 25 % of the conventional time

No-load period: 10 % of the conventional time

A test voltage lower than the rated voltage may be used.

### 8.10.3 Acceptability of the results

After 250 cycles, the measured temperature-rise values shall not exceed the temperature rise measured at the beginning of the tests by more than 15 K.

After 750 cycles, if necessary, the temperature shall not exceed the values measured before the beginning of the tests by more than 20 K.

## 8.11 Mechanical and miscellaneous tests

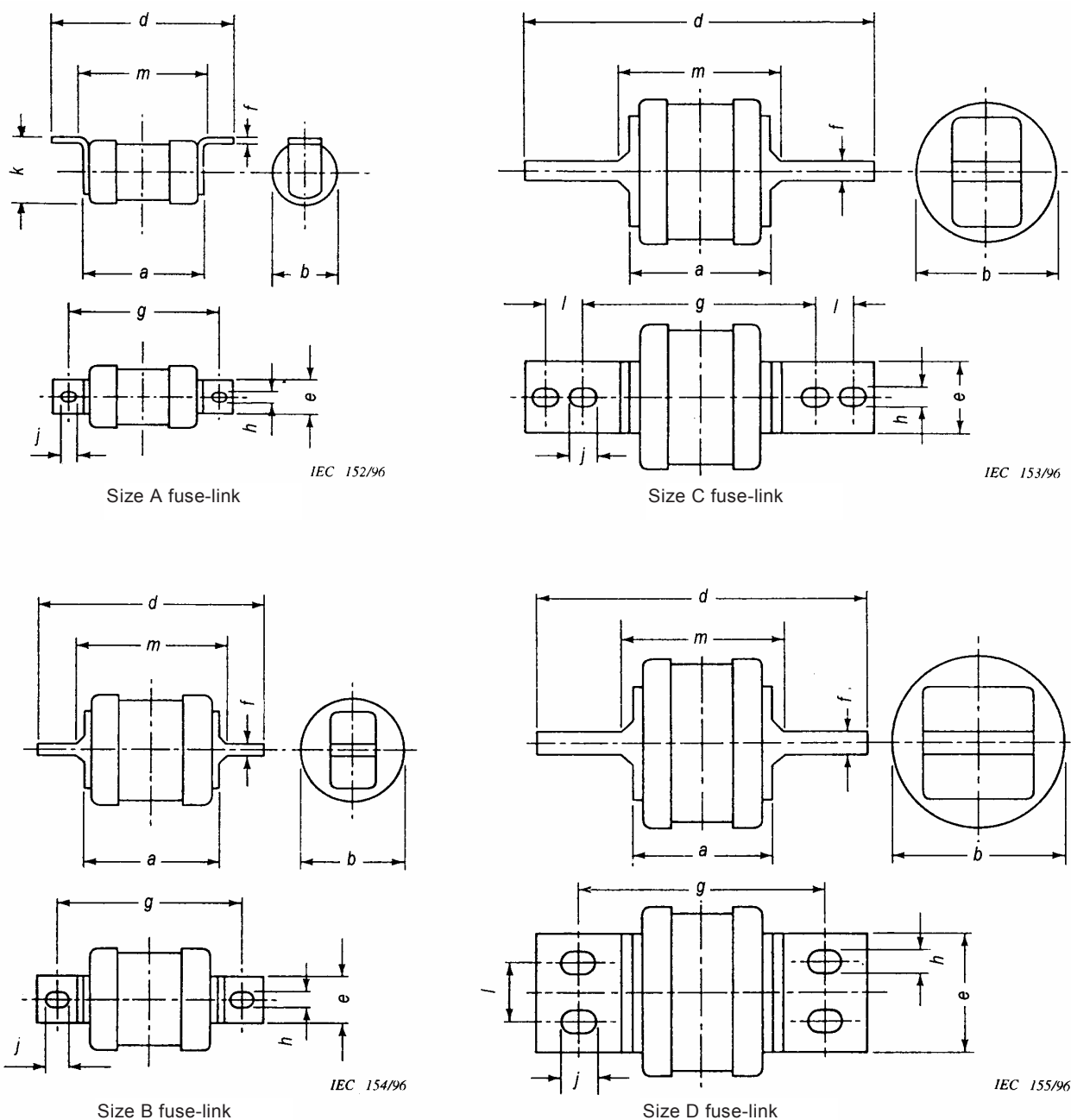
### 8.11.1.1 Mechanical strength of fuse-holders

The fuse-holder, fitted with a fuse-link of the largest rated current and power dissipation that can be accommodated by the fuse-holder, shall be subjected to a temperature rise test at rated current.

At the conclusion of the temperature rise test, the fuse-link or the fuse-carrier as appropriate, shall be withdrawn and inserted into the fuse-base 100 times.

At the conclusion of these tests, all parts shall be intact and shall function normally.

Compliance shall be verified by a further temperature rise test at rated current at the conclusion of which the values obtained shall be not more than 5 K or 15 % (whichever is greater) above the values obtained from the temperature-rise test prior to the commencement of the mechanical test.



The drawings are not intended to govern the design of fuse-links except as regards the notes and dimensions shown.

**Figure 501 – Fuse-links for bolted connection – Sizes A, B, C and D**  
(figure continued on page 193)

Remark: this figure was previously Figure 1 (II) in IEC 60269-2-1, Section II

## Dimensions in millimetres

| Size | Maximum<br>rated<br>current<br>A | Maximum<br>power<br>dissipation<br>W | a<br>(max.)<br>1)2) | b<br>(max.) | d<br>(max.) | e<br>(max.)<br>3) | f<br>(max.)<br>3) |      | g<br>(nom.) | h<br>(nom.) | j<br>(min.)<br>2)4) | k<br>(max.) | l<br>(nom.)<br>1) | m<br>(max.) |
|------|----------------------------------|--------------------------------------|---------------------|-------------|-------------|-------------------|-------------------|------|-------------|-------------|---------------------|-------------|-------------------|-------------|
| A1   | 20                               | 2,7                                  | 36,5                | 14,5        | 56          | 11,2              | 0,8               | 1,5  | 44,5        | 4,2         | 5,5                 | 14,5        | —                 | 36,5        |
| A2   | 32                               | 4,4                                  | 57                  | 24          | 86          | 9,2               | 0,8               | 1,5  | 73          | 5,5         | 7                   | 25,5        | —                 | 60          |
| A3   | 63                               | 6,9                                  | 58                  | 27          | 91          | 13                | 1,2               | 1,6  | 73          | 5,5         | 7                   | 28          | —                 | 61          |
| A4   | 100                              | 9,1                                  | 70                  | 37          | 111         | 20                | 2,4               | 3,2  | 94          | 8,7         | 9,5                 | 38,5        | —                 | 74          |
| B1   | 100                              | 9,1                                  | 70                  | 37          | 138         | 20                | 3,2               | 4    | 111         | 8,7         | 11                  | —           | —                 | 82          |
| B2   | 200                              | 17                                   | 77                  | 42          | 138         | 20                | 3,2               | 4    | 111         | 8,7         | 11                  | —           | —                 | 82          |
| B3   | 315                              | 32                                   | 77                  | 61          | 138         | 26                | 3,2               | 4,8  | 111         | 8,7         | 11                  | —           | —                 | 82          |
| B4   | 400                              | 40                                   | 83                  | 66          | 138         | 26                | 4,8               | 6,6  | 111         | 8,7         | 11                  | —           | —                 | 89          |
| C1   | 400                              | 40                                   | 83                  | 66          | 212         | 26                | 4,8               | 6,6  | 133         | 10,3        | 11                  | —           | 25,4              | 95          |
| C2   | 630                              | 55                                   | 85                  | 77          | 212         | 26                | 6,3               | 7,8  | 133         | 10,3        | 11                  | —           | 25,4              | 95          |
| C3   | 800                              | 70                                   | 89                  | 84          | 212         | 39                | 9,5               | 11,1 | 133         | 10,3        | 12,5                | —           | 25,4              | 101         |
| D1   | 1 250                            | 100                                  | 89                  | 102         | 200         | 64                | 9,5               | 12,7 | 149         | 14,3        | 16,5                | —           | 31,8              | 95          |

1) In all sizes, dimension *a* includes any projections such as rivet heads, but the design of the tags between dimensions *a* and *m* is limited by a line drawn at 45° to the contact surface.

2) All fixing holes are elongated as indicated by *j*, to allow for manufacturing tolerances on dimension *a*.

3) Dimensions *e* and *f*, are nominal material sizes and subject to manufacturing tolerances as specified in the relevant standards for the raw materials.

4) For A1 to A4 size fuse-links, the fixing slots may be extended either axially or laterally to form open-ended slots.

Figure 501 – (concluded)

## Standardized "gM" fuse-links

| Size |          | Standardized ratings | Current rating<br>A | Characteristic rating<br>A |
|------|----------|----------------------|---------------------|----------------------------|
| A1   |          | 20M25                | 20                  | 25                         |
| A1   |          | 20M32                | 20                  | 32                         |
| A2   |          | 32M40                | 32                  | 40                         |
| A2   |          | 32M50                | 32                  | 50                         |
| A2   |          | 32M63                | 32                  | 63                         |
| A3   |          | 63M80                | 63                  | 80                         |
| A3   |          | 63M100               | 63                  | 100                        |
| A4   | } and B1 | 100M125              | 100                 | 125                        |
| A4   |          | 100M160              | 100                 | 160                        |
| A4   |          | 100M200              | 100                 | 200                        |
| B2   |          | 200M250              | 200                 | 250                        |
| B2   |          | 200M315              | 200                 | 315                        |

The power dissipation of "gM" fuse-links is lower than the values given for "gG" fuse-links in the same dimensional references.

Figure 502 – Fuse-links for bolted connection – Sizes A and B

Remark: this figure was previously Figure 1a (II) in IEC 60269-2-1, Section II