

BS HD 60269-2:2010

BS 88-2:2010



BSI Standards Publication

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 J

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National foreword

This British Standard is the UK implementation of HD 60269-2:2010. It is derived from but not identical with IEC 60269-2:2010. It supersedes BS 88-2:2007 which is withdrawn.

This standard covers the following British Fuse systems that are included in HD 60269-2:2010:

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

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

These restructured British Standards together with their IEC counterparts are:

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

BS 88-2:2010 — *Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)* (IEC 60269-2, Fuse systems E, G and I)

BS 88-3:2010 — *Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)* (IEC 60269-3, Fuse system C)

BS EN 60269-4:2009 — *Supplementary requirements for fuse-links for the protection of semiconductor devices* (IEC 60269-4)

The text for BS 88-2:2010 has been extracted from IEC 60269-2:2010 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 this committee 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.

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ISBN 978 0 580 63972 2

ICS 29.120.50

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2010.

Amendments/corrigenda issued since publication

Date	Text affected
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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 J
(IEC 60269-2:2010, 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
normalisés A à J
(CEI 60269-2:2010, modifiée)

Niederspannungssicherungen -
Teil 2: Zusätzliche Anforderungen
an Sicherungen zum Gebrauch durch
Elektrofachkräfte bzw. elektrotechnisch
unterwiesene Personen (Sicherungen
überwiegend für den industriellen
Gebrauch) - Beispiele für genormte
Sicherungssysteme A bis J
(IEC 60269-2:2010, modifiziert)

This Harmonization Document was approved by CENELEC on 2010-09-01. 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, Croatia, 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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 32B/552/FDIS, future edition 4 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/552/FDIS 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 2010-09-01.

This Harmonization Document supersedes HD 60269-2:2007

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) | 2011-09-01 |
| – latest date by which the national standards conflicting
with the EN have to be withdrawn | (dow) | 2013-09-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60269-2:2010 was approved by CENELEC as a Harmonization Document with agreed common modifications.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60060-1	-	High-voltage test techniques - Part 1: General definitions and test requirements	HD 588.1 S1	-
IEC 60112	-	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	-
IEC 60269-1 + A1	2006 2009	Low-voltage fuses - Part 1: General requirements	EN 60269-1 + A1	2007 2009
IEC 60664-1	-	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	-
IEC 60999	Series	Connecting devices - Electrical copper conductors - Safety requirements for screw- type and screwless-type clamping units	EN 60999	Series
IEC 60999-1	-	Connecting devices - Electrical copper conductors - Safety requirements for screw- type and screwless-type clamping units - Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm ² up to 35 mm ² (included)	EN 60999-1	-
IEC 60999-2	-	Connecting devices - Electrical copper conductors - Safety requirements for screw- type and screwless-type clamping units - Part 2: Particular requirements for clamping units for conductors above 35 mm ² up to 300 mm ² (included)	EN 60999-2	-
ISO 6988	-	Metallic and other non-organic coatings - Sulfur dioxide test with general condensation of moisture	EN ISO 6988	-

CONTENTS

INTRODUCTION.....	9
1 General scope	10
1.2 Normative references	11
Fuse system E – Fuses with fuse-links for bolted connections (BS bolted fuse system)	12
1 General	12
1.1 Scope.....	12
2 Terms and definitions	12
3 Conditions for operation in service.....	12
4 Classification.....	12
5 Characteristics of fuses	12
5.3.1 Rated current of the fuse-link.....	12
5.3.2 Rated current of the fuse-holder	12
5.5 Rated power dissipation of a fuse-link and rated acceptable power dissipation of a fuse-holder	12
5.6 Limits of time-current characteristics	13
5.6.1 Time-current characteristics, time-current zones and overload curves	13
5.6.2 Conventional times and currents.....	13
5.6.3 Gates	13
5.7.2 Rated breaking capacity	13
6 Markings	13
6.1 Markings of fuse-holders	13
6.2 Markings of fuse-links.....	13
7 Standard conditions for construction.....	14
7.1 Mechanical design.....	14
7.1.2 Connections including terminals	14
7.2 Insulating properties and suitability for insulation	14
7.9 Protection against electric shock	14
8 Tests	14
8.3 Verification of temperature rise and power dissipation	14
8.3.1 Arrangement of the fuse	14
8.3.3 Measurement of the power dissipation of the fuse-link	14
8.4 Verification of operation	14
8.4.1 Arrangement of the fuse	14
8.5 Verification of breaking capacity.....	14
8.5.1 Arrangement of the fuse	14
8.5.8 Acceptability of test results	14
8.9 Verification of resistance to heat	15
8.10 Verification of non-deterioration of contacts.....	15
8.10.1 Arrangement of the fuse	15
8.10.2 Test method	15
8.10.3 Acceptability of the results.....	15
8.11 Mechanical and miscellaneous tests.....	15

Fuse system G – Fuses with fuse-links with offset blade contacts (BS clip-in fuse system)	26
1 General	26
1.1 Scope	26
2 Terms and definitions	26
3 Conditions for operation in service	26
4 Classification	26
5 Characteristics of fuses	26
5.2 Rated voltage	26
5.3.1 Rated current of the fuse-link	27
5.3.2 Rated current of the fuse-holder	27
5.5 Rated power dissipation of a fuse-link and rated acceptable power dissipation of a fuse-holder	27
5.6.1 Time-current characteristics, time-current zones	27
5.6.2 Conventional times and currents	27
5.6.3 Gates	27
5.7.2 Rated breaking capacity	28
6 Markings	28
6.1 Markings of fuse-holders	28
6.2 Markings of fuse-links	28
7 Standard conditions for construction	28
7.1 Mechanical design	28
7.1.2 Connections including terminals	28
7.2 Insulating properties and suitability for insulation	28
7.7 I^2t characteristics	28
7.9 Protection against electric shock	29
8 Tests	29
8.3.3 Measurement of the power dissipation of the fuse-link	29
8.4.1 Arrangement of the fuse	29
8.5.1 Arrangement of the fuse	29
8.7.4 Verification of overcurrent discrimination	29
8.9 Verification of resistance to heat	30
8.10 Verification of non-deterioration of contacts	30
8.10.1 Arrangement of the fuse	30
8.10.2 Test method	30
8.10.3 Acceptability of test results	30
8.11 Mechanical and miscellaneous tests	30
Fuse system I – gU fuse-links with wedge tightening contacts	36
1 General	36
1.1 Scope	36
2 Terms and definitions	36
3 Conditions for operation in service	36
3.9 Discrimination of fuse-links	36

4	Classification	37
5	Characteristics of fuses	37
5.2	Rated voltage	37
5.3.1	Rated current of the fuse-link	37
5.5	Rated power dissipation of a fuse-link	37
5.6.1	Time-current characteristics, time-current zones	37
5.6.2	Conventional times and currents	37
5.6.3	Gates	37
5.7.2	Rated breaking capacity	38
5.8	Cut-off current and I^2t characteristics	38
6	Markings	38
6.1	Markings of fuse-holders	38
6.2	Markings of fuse-links	38
7	Standard conditions for construction	38
7.1	Mechanical design	38
7.2	Insulating properties and suitability for insulation	38
7.5	Breaking capacity	38
7.7	I^2t characteristics	38
7.8	Overcurrent discrimination of the fuse-links	39
8	Tests	39
8.1.1	Kind of tests	39
8.3.1	Arrangement of the fuse	39
8.3.3	Measurement of the power dissipation of the fuse-link	40
8.4.1	Arrangement of the fuse	40
8.5.1	Arrangement of the fuse	40
8.5.2	Characteristics of the test circuit	40
8.5.5	Test method	40
8.5.8	Acceptability of test results	40
8.7.3	Verification of compliance for fuse-links at 0,01 s	41
8.9	Verification of resistance to heat	41
8.11	Mechanical and miscellaneous tests	41
	Bibliography	50
	Figure 501 – Fuse-links for bolted connection – Sizes A, B, C and D	17
	Figure 502 – Fuse-links for bolted connection – Sizes A and B	18
	Figure 503 – Typical fuse-holder	19
	Figure 504 – Time-current zones for "gG" fuse-link	21
	Figure 505 – Time-current zones for "gG" fuse-link	22
	Figure 506 – Power dissipation test rig	23
	Figure 507 – Breaking capacity test rig for fuse-links for bolted connection	24

Figure 701 – Fuse-links having offset blade contacts, sizes E1, F1, F2 and F3	31
Figure 702 – Typical fuse-holder	32
Figure 703 – Time-current zones for "gG" fuse-links	33
Figure 704 – Time-current zones for "gG" fuse-links	34
Figure 705 – Power dissipation test rig	35
Figure 901 – Time-current zones for current ratings 100 A, 200 A, 355 A and 630 A	42
Figure 902 – Time-current zones for current ratings 160 A and 315 A	43
Figure 903 – Time-current zones for current ratings 250 A and 500 A	44
Figure 904 – Time-current zones for current ratings 200 A and 400 A	45
Figure 905 – Dimensions for fuse-links with L type and U type tags	46
Figure 906 – Power dissipation test rig	47
Figure 907 – Breaking capacity test rig	48
Table 501 – Conventional time and current for "gG" fuse-links	13
Table 502 – Gates for specified pre-arcing times of "gG" fuse-links	13
Table 701 – Conventional time and current for "gG" fuse-links	27
Table 702 – Gates for specified pre-arcing times of "gG" fuse-links	27
Table 703 – Sizes of copper conductors	28
Table 704 – Pre-arcing I^2t values at 0,01 s for "gG" fuse-links	29
Table 901 – Maximum power dissipation values	37
Table 902 – Pre-arcing I^2t values for gU fuse-links at 0,01 s	39
Table 903 – Cross-sectional area of conductors for power dissipation and temperature-rise tests	40

INTRODUCTION

A reorganization of the different parts of the IEC 60269 series has been carried out, in order to simplify its use, especially by the laboratories which test the fuses.

This fourth edition is based on edition 3 of IEC 60269-2. Edition 3 was a result of a restructuring of the IEC 60269 series of standards in 2006. At this time IEC 60269-1, IEC 60269-2, IEC 60269-2-1, IEC 60269-3 and IEC 60269-3-1 have been integrated into either the new part 1 or the new parts 2 or 3, according to the subjects considered, so that the clauses which deal exclusively with “fuses for authorized persons” are separated from the clauses dealing with “fuses for unskilled persons”.

As far as IEC 60269-4 and IEC 60269-4-1 are concerned, they have been integrated into the new part 4 which deals with the fuse-links used for semiconductor protection.

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 J

1 General scope

Fuses for use by authorized persons are generally designed to be used in installations where the fuse-links are accessible to, and may be replaced by, authorized persons only.

Fuses for use by authorized persons according to the following fuse systems also comply with the requirements of the corresponding subclauses of IEC 60269-1, unless otherwise defined in this standard.

This standard is divided into fuse systems, each dealing with a specific example of standardized fuses for use by authorized persons:

- Fuse system A: Fuses with fuse-links with blade contacts (NH fuse system)
- Fuse system B: Fuses with striker fuse-links with blade contacts (NH fuse system)
- Fuse system C: Fuse-rails (NH fuse system)
- Fuse system D: Fuse-bases for busbar mounting (NH fuse system)
- Fuse system E: Fuses with fuse-links for bolted connections (BS bolted fuse system)
- Fuse system F: Fuses with fuse-links having cylindrical contact caps (NF cylindrical fuse system)
- Fuse system G: Fuses with fuse-links with offset blade contacts (BS clip-in fuse system)
- Fuse system H: Fuses with fuse-links having "gD" and "gN" characteristic (Class J and class L time delay and non time delay fuse types)
- Fuse system I: gU fuse-links with wedge tightening contacts
- Fuse system J: Fuses with fuse-links having "gD class CC" and "gN class CC" characteristics (Class CC time delay and non-time delay fuse types)

NOTE The following fuse systems are standardized systems in respect to their safety aspects. The National Committees shall select at least one complete fuse system of this standard for their national standards. The time current characteristics "gD" and "gN" are only relevant for the fuse system H.

1.2 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 60060-1: *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60112: *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60269-1:2006, *Low-voltage fuses – Part 1: General requirements*
Amendment 1 (2009)

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

IEC 60999 (all parts), *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units*

IEC 60999-1, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

IEC 60999-2, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 2: Particular requirements for clamping units for conductors above 35 mm² up to 300 mm² (included)*

ISO 6988: *Metallic and other non organic coatings – Sulfur dioxide test with general condensation of moisture*

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

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

Rated current I_n A	Conventional time 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

I_n A	I_{min} (10 s) A	I_{max} (5 s) A	I_{min} (0,1 s) A	I_{max} (0,1 s) 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.

7.2 Insulating properties and suitability for insulation

The creepage distances and clearances of fuse parts shall meet the requirements of IEC 60664-1 for overvoltage category III and degree of pollution 3.

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.