



NSAI
Standards

Standard Recommendation
S.R. CLC/TR 60269-5:2011

Low-voltage fuses -- Part 5: Guidance for the application of low-voltage fuses (IEC/TR 60269-5:2010 (EQV))

S.R. CLC/TR 60269-5:2011

Incorporating amendments/corrigenda issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

<i>This document replaces:</i>	<i>This document is based on:</i> CLC/TR 60269-5:2011	<i>Published:</i> 29 April, 2011
This document was published under the authority of the NSAI and comes into effect on: 10 May, 2011		ICS number: 29.120.50
NSAI 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W NSAI.ie	Sales: T +353 1 857 6730 F +353 1 857 6729 W standards.ie
Údarás um Chaighdeáin Náisiúnta na hÉireann		

TECHNICAL REPORT

CLC/TR 60269-5

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

April 2011

ICS 29.120.50

English version

**Low-voltage fuses -
Part 5: Guidance for the application of low-voltage fuses
(IEC/TR 60269-5:2010)**

Fusibles basse tension -
Partie 5: Lignes directrices pour
l'application des fusibles basse tension
(CEI/TR 60269-5:2010)

Niederspannungssicherungen -
Teil 5: Leitfaden für die Anwendung von
Niederspannungssicherungen
(IEC/TR 60269-5:2010)

This Technical Report was approved by CENELEC on 2011-04-25.

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

S.R. CLC/TR 60269-5:2011

CLC/TR 60269-5:2011

- 2 -

Foreword

This Technical Report consists of the text of the International Technical Report IEC/TR 60269-5:2010 prepared by SC 32B, Low-voltage fuses, of IEC TC 32, Fuses.

It was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.4.3.3 (simple majority) and was accepted by CENELEC as CLC/TR 60269-5 on 2011-04-25.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the Technical Report IEC/TR 60269-5:2010 was approved by CENELEC as a Technical Report without any modification.

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 60050-441	-	International Electrotechnical Vocabulary (IEV) - Chapter 441: Switchgear, controlgear and fuses	-	-
IEC/TR 60146-6	-	Semiconductor convertors - Part 6: Application guide for the protection of semiconductor convertors against overcurrent by fuses	-	-
IEC 60269	Series	Low-voltage fuses	EN 60269	Series
IEC 60269-1	-	Low-voltage fuses - Part 1: General requirements	EN 60269-1	-
IEC 60269-2	-	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	HD 60269-2	-
IEC 60269-3 (mod)	-	Low-voltage fuses - Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications) - Examples of standardized systems of fuses A to F	HD 60269-3	-
IEC 60269-4	-	Low-voltage fuses - Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices	EN 60269-4	-
IEC 60364-4-41 (mod)	-	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41	-
IEC 60364-4-43 (mod)	-	Low voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent	HD 60364-4-43	-
IEC 60364-5-52 (mod)	-	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems	HD 60364-5-52	-
IEC/TR 60787	-	Application guide for the selection of high-voltage current-limiting fuse-links for transformer circuits	-	-
IEC 60947	Series	Low-voltage switchgear and controlgear	EN 60947	Series
IEC 60947-3	-	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	EN 60947-3	-

S.R. CLC/TR 60269-5:2011

CLC/TR 60269-5:2011

- 4 -

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60947-4-1	-	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor- starters	EN 60947-4-1	-
IEC/TR 61912-1	-	Low-voltage switchgear and controlgear - Overcurrent protective devices - Part 1: Application of short-circuit ratings	-	-

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 Fuse benefits.....	10
5 Fuse construction and operation.....	11
5.1 Components	11
5.2 Fuse-construction.....	11
5.2.1 Fuse link.....	11
5.2.2 Fuse-link contacts	13
5.2.3 Indicating device and striker	13
5.2.4 Fuse-base	13
5.2.5 Replacement handles and fuse-holders	13
5.3 Fuse operation	14
5.3.1 General	14
5.3.2 Fuse operation in case of short-circuit	14
5.3.3 Fuse operation in case of overload	14
6 Fuse-combination units	15
7 Fuse selection and markings	16
8 Conductor protection	18
8.1 General.....	18
8.2 Type gG	18
8.3 Types gN and gD	19
8.4 Types gR and gS.....	19
8.5 Protection against short-circuit current only.....	19
9 Selectivity of protective devices.....	20
9.1 General.....	20
9.2 Selectivity between fuses	21
9.2.1 Verification of selectivity for operating time $\geq 0,1$ s	21
9.2.2 Verification of selectivity for operating time $< 0,1$ s	22
9.2.3 Verification of total selectivity	22
9.3 Selectivity of circuit-breakers upstream of fuses	22
9.3.1 General	22
9.3.2 Verification of selectivity for operating time $\geq 0,1$ s	22
9.3.3 Verification of selectivity for operating time $< 0,1$ s	23
9.3.4 Verification of total selectivity	23
9.4 Selectivity of fuses upstream of circuit-breakers	23
9.4.1 General	23
9.4.2 Verification of selectivity for operating time $\geq 0,1$ s	23
9.4.3 Verification of selectivity for operating time $< 0,1$ s	23
9.4.4 Verification of total selectivity	23
10 Short-circuit damage protection	25
10.1 General.....	25
10.2 Short-circuit current paths	25

10.3	Current limitation	26
10.4	Rated conditional short-circuit current, rated breaking capacity	26
11	Protection of power factor correction capacitors	26
12	Transformer protection	27
12.1	Distribution transformers with a high-voltage primary	27
12.2	Distribution transformers with a low-voltage primary	28
12.3	Control circuit transformers	28
13	Motor circuit protection	28
13.1	General	28
13.2	Fuse and motor-starter coordination	29
13.3	Criteria for coordination at the rated conditional short-circuit current I_q	29
13.4	Criteria for coordination at the crossover current I_{co}	30
13.5	Criteria for coordination at test current “r”	31
14	Circuit-breaker protection	31
15	Protection of semiconductor devices	31
16	Fuses in enclosures	32
16.1	Limiting temperature of type gG fuse-links according to IEC 60269-2 – System A	32
16.2	Other fuse-links	33
17	DC applications	33
17.1	Short-circuit protection	33
17.2	Overload protection	33
17.3	Time-current characteristics	34
18	Automatic disconnection for protection against electric shock for installations in buildings	35
18.1	General	35
18.2	Principle of the protection	35
18.3	Examples	37
Annex A (informative) Coordination between fuses and contactors/motor-starters		38
Bibliography		48
Figure 1 – Typical fuse-link according to IEC 60269-2		12
Figure 2 – Typical fuse-link according to IEC 60269-2		13
Figure 3 – Current-limiting fuse operation		14
Figure 4 – Fuse operation on overload		15
Figure 5 – Selectivity – General network diagram		20
Figure 6 – Verification of selectivity between fuses F_2 and F_4 for operating time $t \geq 0,1$ s		21
Figure 7 – Verification of selectivity between circuit-breaker C_2 and fuses F_5 and F_6		22
Figure 8 – Verification of selectivity between fuse F_2 and circuit-breaker C_3 for operating time $t \geq 0,1$ s		24
Figure 9 – Verification of selectivity between fuse F_2 and circuit-breaker C_3 for operating time $t < 0,1$ s		25
Figure 10 – Fuse and motor-starter coordination		30
Figure 11 – DC circuit		33
Figure 12 – DC breaking operation		34
Figure 13 – Fuse operating time at various d.c. circuit time constants		35

Figure 14 – Time-current characteristic.....	36
Figure A.1 – Collation of cut-off currents observed in successful coordination at I_q	39
Figure A.2 – Pre-arcing and operating I^2t values of fuses used in successful coordination tests as a function of contactor rated current AC3.....	40
Figure A.3 – Pre-arcing and operating I^2t values of fuses used in successful coordination tests as a function of fuse rated current I_n	41
Figure A.4 – Illustration of the method of selection of the maximum rated current of a fuse for back-up protection of a contactor of rating $I_e = X$ amperes	45
Figure A.5 – Withstand capabilities of a range of contactors and associated overload relays at test current "r"	46
Figure A.6 – Illustration of a method of deriving curves of maximum peak current at test current "r" as a function of fuse rated current (these derived curves can be used in the same way as illustrated in Figure A.4).....	47
Table 1 – Definitions and symbols of switches and fuse-combination units.....	16
Table 2 – Fuse application	17
Table 3 – Maximum operational voltage of fuse-links	18
Table 4 – Fuse selection for power factor correction capacitors (fuses according to IEC 60269-2, system A)	27
Table 5 – Time constants of typical d.c. circuits	34
Table A.1 – Examples of typical fuse-link ratings used for motor-starter protection illustrating how the category of fuse-link can influence the optimum current rating	38
Table A.2 (Table 12 of IEC 60947-4-1) – Value of the prospective test current according to the rated operational current.....	43
Table A.3 – Types of coordination.....	44

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE FUSES –

Part 5: Guidance for the application of low-voltage fuses

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 60269-5, which is a technical report, has been prepared by subcommittee 32B: Low-voltage fuses, of IEC technical committee 32: Fuses.

This technical report cancels and replaces IEC/TR 61818, published in 2003, and IEC/TR 61459, published in 1996. It constitutes a minor revision by amending and restructuring the two replaced publications.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
32B/554/DTR	32B/566/RVC

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Fuses protect many types of equipment and switchgear against the effects of over-current which can be dramatic:

- thermal damage of conductors or bus-bars;
- vaporisation of metal;
- ionisation of gases;
- arcing, fire, explosion,
- insulation damage.

Apart from being hazardous to personnel, significant economic losses can result from downtime and the repairs required to restore damaged equipment.

Modern fuses are common overcurrent protective devices in use today, and as such provide an excellent cost effective solution to eliminate or minimize the effects of overcurrent.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- Looking for additional Standards? Visit Intertek Inform Infostore
 - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-