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REDLINE VERSION

Termosäkringar – Fordringar och provningsmetoder

*Thermal-links –
Requirements and application guide*

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REDLINE VERSION

INTERNATIONAL STANDARD



Thermal-links – Requirements and application guide

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD	5
INTRODUCTION	2
1 Scope	8
2 Normative references	8
3 Terms and definitions	9
4 General requirements	11
5 General notes on tests	12
6 Classification	14
6.1 Electrical conditions	14
6.2 Thermal conditions	14
6.3 Resistance to tracking	14
7 Marking	14
8 Documentation	15
9 Constructional requirements	16
9.1 General	16
9.2 Lead secureness tests	17
9.2.1 General	17
9.2.2 Tensile test	17
9.2.3 Thrust test	17
9.2.4 Bending/twist test	17
9.3 Contacts used for the current path	18
9.4 Accessible mounting brackets or metal parts	19
9.5 Insulating materials	19
9.6 Resistance to tracking	19
9.7 Creepage distances and clearances	19
9.8 Temperature and humidity cycle conditioning	20
9.9 Terminals and terminations	20
10 Electrical requirements	21
10.1 Dielectric strength	21
10.2 Insulation resistance	21
10.3 Interrupting current	22
10.3.1 General	22
10.3.2 Specific conditions	22
10.4 Transient overload current	24
10.5 Limited short-circuit test	24
10.5.1 General	24
10.5.2 Test method	24
10.5.3 Fuse size (rating)	25
10.5.4 Compliance	25
11 Temperature tests	25
11.1 General	25
11.2 Holding temperature, T_h	26
11.3 Rated functioning temperature, T_f	26
11.4 Maximum temperature limit, T_m	27
11.5 Ageing	27

12	Resistance to rusting.....	28
13	Manufacturer's validation programme	28
Annex A (normative) Application guide.....		29
Annex B (normative) Alternative ageing test for thermal-links with T_h greater than 250 °C for use in electric irons.....		30
Annex C (normative) Conductive heat ageing test		31
C.1	Conductive heat ageing test.....	31
C.2	Method.....	31
C.2.1	General.....	31
C.2.2	Typical test fixture assembly	31
C.2.3	Temperature setting	31
C.2.4	Temperature behaviour.....	31
C.2.5	Temperature monitoring.....	32
C.3	Ageing	32
C.3.1	General.....	32
C.3.2	Cooling operation	32
C.3.3	Premature operation.....	32
C.4	Results.....	33
C.5	Dielectric strength test.....	33
C.6	Test oven	35
Annex D (informative) Extended holding temperature evaluation.....		37
D.1	Extended holding temperature conditioning test.....	37
D.2	Load current interrupt test.....	37
Annex E (normative) Seal ageing test		39
Annex F (normative) Identification requirements.....		41
Annex G (normative) Indelibility of markings		42
Annex H (normative) Requirements for thermal-link packaged assemblies		43
Annex I (informative) Holding temperature		48
Bibliography.....		49
Figure 1 – Bending/twist test		18
Figure C.1 – Typical test fixture assembly.....		34
Figure C.2 – Typical thermal-link test oven.....		36
Figure D.1 – Typical terminal block support test fixture.....		38
Figure E.1 – Conditioning time versus oven temperature for proposed temperature index.....		40
Figure G.1 – Apparatus for testing durability of markings.....		42
Table 1 – Test schedule		13
Table 2 – Strength of leads and terminal parts – Minimum required tensile and thrust test forces.....		18
Table 3 – Creepage distances and clearances (absolute minimum values).....		20
Table 4 – Test voltages for dielectric strength		21
Table 5 – Test current for interrupting test		22
Table 6 – Limited short-circuit test capacity.....		25

Table H.1 – Push and pull force.....	45
Table H.2 – Minimum nominal cross-sectional area of conductor	45
Table H.3 – Allowed values for the materials used in the thermal-link package.....	47

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**THERMAL-LINKS –
REQUIREMENTS AND APPLICATION GUIDE****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.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60691:2015+AMD1:2019 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60691 has been prepared by subcommittee 32C: Miniature fuses, of IEC technical committee 32: Fuses. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2015 and Amendment 1:2019. This edition constitutes a technical revision.

This fifth edition includes the following significant technical changes with respect to the previous edition:

- a) requirements for thermal-link packaged assemblies;
- b) renew the requirements and definitions for T_h -test;

The harmonization of the USA national standard, UL 1020, fifth edition (withdrawn 2003), and IEC 60691:1993, together with its Amendment 1:1995 and Amendment 2:2000 have served as a basis for the elaboration of this standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
32C/604/FDIS	32C/605/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The following differing practices of a less permanent nature exist in the country indicated below:

- Annex C is required to be declared in the USA;
- Annex E is required in the USA, if applicable;
- Annex F is required to be declared in the USA.

In this standard, the following type is used:

- *compliance statements: in italic type.*

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document 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

Thermal-links, defined as non-resettable devices functioning once only without refunctioning, are widely applied for the thermal protection of equipment in which, under fault (abnormal) conditions, one or more parts may reach hazardous temperatures.

As these devices have several aspects in common with miniature fuse-links and are used for obtaining a comparable degree of protection, this standard has endeavoured to lay down a number of basic requirements for such devices.

THERMAL-LINKS – REQUIREMENTS AND APPLICATION GUIDE

1 Scope

This International Standard is applicable to thermal-links intended for incorporation in electrical appliances, electronic equipment and component parts thereof, normally intended for use indoors, in order to protect them against excessive temperatures under abnormal conditions.

NOTE 1 The equipment is not designed to generate heat.

NOTE 2 The effectiveness of the protection against excessive temperatures logically depends upon the position and method of mounting of the thermal-link, as well as upon the current which it is carrying.

This document may be applicable to thermal-links for use under conditions other than indoors, provided that the climatic and other circumstances in the immediate surroundings of such thermal-links are comparable with those in this standard.

This document may be applicable to thermal-links in their simplest forms (e.g. melting strips or wires), provided that molten materials expelled during function cannot adversely interfere with the safe use of the equipment, especially in the case of hand-held or portable equipment, irrespective of its position.

Annex H of this document is applicable to thermal-link packaged assemblies where the thermal-link(s) has already been approved to this standard but packaged in a metallic or non-metallic housing and provided with terminals/wiring leads.

This document is applicable to thermal-links with a rated voltage not exceeding 690 V AC or DC and a rated current not exceeding 63 A.

The objectives of this document are:

- a) to establish uniform requirements for thermal-links,
- b) to define methods of test, and
- c) to provide useful information for the application of thermal-links in equipment.

This document is not applicable to thermal-links used under extreme conditions such as corrosive or explosive atmospheres.

This document is not applicable to thermal-links to be used in circuits on AC with a frequency lower than 45 Hz or higher than 62 Hz.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60112:2003/2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
~~IEC 60112:2003/AMD1:2009~~

IEC 60127-2:2014, *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 60216-5:2008, *Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

IEC 60664-1:~~2007~~2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60695-2-12:~~2010~~2021, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*
~~IEC 60695-2-12:2010/AMD1:2014~~

IEC 60695-2-13:~~2010~~2021, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*
~~IEC 60695-2-13:2010/AMD1:2014~~

IEC 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*

IEC 60730-1:2013/AMD1:2015

IEC 60730-1:2013/AMD2:2020

IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

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Termosäkringar – Fordringar och provningsmetoder

*Thermal-links –
Requirements and application guide*

Som svensk standard gäller europastandarden EN IEC 60691:2023. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60691:2023.

Nationellt förord

Europastandarden EN IEC 60691:2023

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60691, Fifth edition, 2023 - Thermal-links – Requirements and application guide**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60691, utg 5:2016 med eventuella tillägg, ändringar och rättelser gäller ej fr o m 2026-10-04.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

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SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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English Version

**Thermal-links - Requirements and application guide
(IEC 60691:2023)**

Protecteurs thermiques - Exigences et guide d'application
(IEC 60691:2023)

Temperatursicherungen - Anforderungen und
Anwendungshinweise
(IEC 60691:2023)

This European Standard was approved by CENELEC on 2023-10-04. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 32C/604/FDIS, future edition 5 of IEC 60691, prepared by SC 32C "Miniature fuses" of IEC/TC 32 "Fuses" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60691:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2024-07-04 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2026-10-04 document have to be withdrawn

This document supersedes EN 60691:2016 and all of its amendments and corrigenda (if any).

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Endorsement notice

The text of the International Standard IEC 60691:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60085:2007	NOTE Approved as EN 60085:2008 (not modified)
IEC 60695-10-3:2016	NOTE Approved as EN 60695-10-3:2016 (not modified)
IEC 60695-11-20:2015	NOTE Approved as EN 60695-11-20:2015 (not modified)
IEC 60127-1:2006	NOTE Approved as EN 60127-1:2006 (not modified)
IEC 60127-1:2006/A1:2011	NOTE Approved as EN 60127-1:2006/A1:2011 (not modified)
IEC 60127-1:2006/A2:2015	NOTE Approved as EN 60127-1:2006/A2:2015 (not modified)
IEC 60216-1:2013	NOTE Approved as EN 60216-1:2013 (not modified)
IEC 60695-2-11:2021	NOTE Approved as EN IEC 60695-2-11:2021 (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60065	2014	Audio, video and similar electronic apparatus - Safety requirements	-	-
IEC 60112	2020	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN IEC 60112	2020
IEC 60127-2	2014	Miniature fuses - Part 2: Cartridge fuse-links	EN 60127-2	2014
IEC 60216-5	2008	Electrical insulating materials - Thermal endurance properties - Part 5: Determination of relative thermal endurance index (RTE) of an insulating material	EN 60216-5	2008
IEC 60664-1	2020	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	2020
IEC 60695-2-12	2021	Fire hazard testing - Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability index (GWFI) test method for materials	EN IEC 60695-2-12	2021
IEC 60695-2-13	2021	Fire hazard testing - Part 2-13: Glowing/hot-wire based test methods - Glow-wire ignition temperature (GWIT) test method for materials	EN IEC 60695-2-13	2021
IEC 60695-10-2	2014	Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test method	EN 60695-10-2	2014
IEC 60695-11-10	2013	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods	EN 60695-11-10	2013
IEC 60730-1 (mod)	2013	Automatic electrical controls - Part 1: General requirements	EN 60730-1	2016
+ A1	2015		+ A1	2019
+ A2	2020		+ A2	2022

EN IEC 60691:2023 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61210 (mod)	2010	Connecting devices - Flat quick-connect terminations for electrical copper conductors - Safety requirements	EN 61210	2010

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Thermal-links – Requirements and application guide

Protecteurs thermiques – Exigences et guide d'application

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 General requirements	11
5 General notes on tests	12
6 Classification.....	14
6.1 Electrical conditions.....	14
6.2 Thermal conditions.....	14
6.3 Resistance to tracking.....	14
7 Marking	14
8 Documentation	15
9 Constructional requirements	16
9.1 General.....	16
9.2 Lead secureness tests	17
9.2.1 General	17
9.2.2 Tensile test.....	17
9.2.3 Thrust test	17
9.2.4 Bending/twist test	17
9.3 Contacts used for the current path	18
9.4 Accessible mounting brackets or metal parts	19
9.5 Insulating materials.....	19
9.6 Resistance to tracking.....	19
9.7 Creepage distances and clearances.....	19
9.8 Temperature and humidity cycle conditioning.....	20
9.9 Terminals and terminations	20
10 Electrical requirements	21
10.1 Dielectric strength.....	21
10.2 Insulation resistance	21
10.3 Interrupting current	22
10.3.1 General	22
10.3.2 Specific conditions.....	22
10.4 Transient overload current	23
10.5 Limited short-circuit test.....	24
10.5.1 General	24
10.5.2 Test method	24
10.5.3 Fuse size (rating).....	25
10.5.4 Compliance	25
11 Temperature tests	25
11.1 General.....	25
11.2 Holding temperature, T_h	26
11.3 Rated functioning temperature, T_f	26
11.4 Maximum temperature limit, T_m	26
11.5 Ageing	27

12	Resistance to rusting	27
13	Manufacturer's validation programme	28
	Annex A (normative) Application guide.....	29
	Annex B (normative) Alternative ageing test for thermal-links with T_h greater than 250 °C for use in electric irons	30
	Annex C (normative) Conductive heat ageing test.....	31
	C.1 Conductive heat ageing test.....	31
	C.2 Method	31
	C.2.1 General	31
	C.2.2 Typical test fixture assembly.....	31
	C.2.3 Temperature setting.....	31
	C.2.4 Temperature behaviour.....	31
	C.2.5 Temperature monitoring.....	32
	C.3 Ageing	32
	C.3.1 General	32
	C.3.2 Cooling operation	32
	C.3.3 Premature operation	32
	C.4 Results	33
	C.5 Dielectric strength test	33
	C.6 Test oven.....	33
	Annex D (informative) Extended holding temperature evaluation.....	35
	D.1 Extended holding temperature conditioning test.....	35
	D.2 Load current interrupt test.....	35
	Annex E (normative) Seal ageing test	37
	Annex F (normative) Identification requirements	39
	Annex G (normative) Indelibility of markings	40
	Annex H (normative) Requirements for thermal-link packaged assemblies	41
	Annex I (informative) Holding temperature	45
	Bibliography.....	46
	 Figure 1 – Bending/twist test.....	18
	Figure C.1 – Typical test fixture assembly.....	33
	Figure C.2 – Typical thermal-link test oven	34
	Figure D.1 – Typical terminal block support test fixture	36
	Figure E.1 – Conditioning time versus oven temperature for proposed temperature index	38
	Figure G.1 – Apparatus for testing durability of markings	40
	 Table 1 – Test schedule.....	13
	Table 2 – Strength of leads and terminal parts – Minimum required tensile and thrust test forces.....	18
	Table 3 – Creepage distances and clearances (absolute minimum values)	20
	Table 4 – Test voltages for dielectric strength.....	21
	Table 5 – Test current for interrupting test	22
	Table 6 – Limited short-circuit test capacity	24
	Table H.1 – Push and pull force	43

Table H.2 – Minimum nominal cross-sectional area of conductor	43
Table H.3 – Allowed values for the materials used in the thermal-link package	44

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**THERMAL-LINKS –
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IEC 60691 has been prepared by subcommittee 32C: Miniature fuses, of IEC technical committee 32: Fuses. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2015 and Amendment 1:2019. This edition constitutes a technical revision.

This fifth edition includes the following significant technical changes with respect to the previous edition:

- a) requirements for thermal-link packaged assemblies;
- b) renew the requirements and definitions for T_h -test;

The harmonization of the USA national standard, UL 1020, fifth edition (withdrawn 2003), and IEC 60691:1993, together with its Amendment 1:1995 and Amendment 2:2000 have served as a basis for the elaboration of this standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
32C/604/FDIS	32C/605/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The following differing practices of a less permanent nature exist in the country indicated below:

- Annex C is required to be declared in the USA;
- Annex E is required in the USA, if applicable;
- Annex F is required to be declared in the USA.

In this standard, the following type is used:

- *compliance statements: in italic type.*

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

Thermal-links, defined as non-resettable devices functioning once only without refunctioning, are widely applied for the thermal protection of equipment in which, under fault (abnormal) conditions, one or more parts may reach hazardous temperatures.

As these devices have several aspects in common with miniature fuse-links and are used for obtaining a comparable degree of protection, this standard has endeavoured to lay down a number of basic requirements for such devices.

THERMAL-LINKS – REQUIREMENTS AND APPLICATION GUIDE

1 Scope

This International Standard is applicable to thermal-links intended for incorporation in electrical appliances, electronic equipment and component parts thereof, normally intended for use indoors, in order to protect them against excessive temperatures under abnormal conditions.

NOTE 1 The equipment is not designed to generate heat.

NOTE 2 The effectiveness of the protection against excessive temperatures logically depends upon the position and method of mounting of the thermal-link, as well as upon the current which it is carrying.

This document may be applicable to thermal-links for use under conditions other than indoors, provided that the climatic and other circumstances in the immediate surroundings of such thermal-links are comparable with those in this standard.

This document may be applicable to thermal-links in their simplest forms (e.g. melting strips or wires), provided that molten materials expelled during function cannot adversely interfere with the safe use of the equipment, especially in the case of hand-held or portable equipment, irrespective of its position.

Annex H of this document is applicable to thermal-link packaged assemblies where the thermal-link(s) has already been approved to this standard but packaged in a metallic or non-metallic housing and provided with terminals/wiring leads.

This document is applicable to thermal-links with a rated voltage not exceeding 690 V AC or DC and a rated current not exceeding 63 A.

The objectives of this document are:

- a) to establish uniform requirements for thermal-links,
- b) to define methods of test, and
- c) to provide useful information for the application of thermal-links in equipment.

This document is not applicable to thermal-links used under extreme conditions such as corrosive or explosive atmospheres.

This document is not applicable to thermal-links to be used in circuits on AC with a frequency lower than 45 Hz or higher than 62 Hz.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127-2:2014, *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 60216-5:2008, *Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60695-2-12:2021, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60695-2-13:2021, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*

IEC 60730-1:2013/AMD1:2015

IEC 60730-1:2013/AMD2:2020

IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*