UL 61810-1:2026

(IEC 61810-1:2019, MOD)

STANDARD FOR SAFETY

Electromechanical Elementary Relays – Part 1: General and Safety Requirements

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UL Standard for Safety for Electromechanical Elementary Relays – Part 1: General and Safety Requirements, UL 61810-1

Second Edition, Dated June 15, 2026

Summary of Topics

This new Second Edition of ANSI/UL 61810-1, dated June 15, 2026 includes updates to 10.1 and Annex I to align with IEC 61810-1.

UL 61810-1 is an Adoption of IEC 61810-1, Edition 4.1, issued by IEC November 2019. Please note that the national difference document incorporates all of the U.S. national differences for UL 61810-1.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated July 11, 2025, December 19, 2025, and February 20, 2026.

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UL 61810-1:2026
Second Edition

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Second Edition
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Electromechanical Elementary Relays – Part 1: General and Safety Requirements

June 15, 2026

ANSI/UL 61810-1-2026

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Preface

This is the harmonized CSA Group, ECIA, and ULSE Standard for Electromechanical Elementary Relays – Part 1: General and Safety Requirements. It is the first edition of CSA C22.2 No. 61810-1, and the second edition of UL 61810-1.

This harmonized standard is based on IEC Publication 61810-1: Edition 4.1, Electromechanical Elementary Relays – Part 1: General and Safety Requirements, issued November 2019. IEC 61810-1 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group, ECIA, and ULSE. The efforts and support of the International Harmonization Committee (IHC) for the adoption of the IEC series of standards for Electromechanical Elementary Relays, are gratefully acknowledged.

This Standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This Standard was reviewed by the CSA Integrated Committee on Industrial Control, under the jurisdiction of the CSA Technical Committee on Industrial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA Group, ECIA, and ULSE.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group, ECIA, and ULSE versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences From IEC

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The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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National Differences from the text of International Electrotechnical Commission (IEC) Publication 61810-1, Electromechanical elementary relays – Part 1: General and safety requirements, copyright 2019 are indicated by notations (differences) and are presented in bold text.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

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Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL ELEMENTARY RELAYS – Part 1: General and safety requirements

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 consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61810-1 edition 4.1 contains the fourth edition (2015-02) [documents 94/380/FDIS and 94/384/RVD], its corrigenda 1 (2017-06), 2 (2018-02), its amendment 1 (2019-11) [documents 94/450/CDV and 94/460/RVC], and its Interpretation Sheet 1 of January 2023.

International Standard IEC 61810-1 has been prepared by IEC technical committee 94: All-ornothing electrical relays.

This fourth edition constitutes a technical revision.

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

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– two main test procedures were introduced: procedure A, reflecting the procedure known from Edition 3 of this standard and procedure B, reflecting the assessment according to North American requirements;

– inclusion of dedicated device application tests especially relevant for applications in the North American Market (see Clause D.1);

– introduction of testing under single mounting condition;

– clarification of insulation requirements after endurance testing;

– inclusion of provisions for basic safety requirements;

– update of references.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of IEC 61810 series, published under the general title Electromechanical elementary relays can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment 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.

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ELECTROMECHANICAL ELEMENTARY RELAYS – Part 1: General and safety requirements

1 Scope

This part of IEC 61810 applies to electromechanical elementary relays (non-specified time all-or-nothing relays) for incorporation into low voltage equipment (circuits up to 1 000 V alternate current or 1 500 V direct current). It defines the basic functional and safety requirements and safety-related aspects for applications in all areas of electrical engineering or electronics, such as:

• general industrial equipment,

• electrical facilities,

• electrical machines,

• electrical appliances for household and similar use,

• information technology and business equipment,

• building automation equipment,

• automation equipment,

• electrical installation equipment,

• medical equipment,

• control equipment,

• telecommunications,

• vehicles,

• transportation (e.g. railways).

Compliance with the requirements of this standard is verified by the type tests indicated.

In case the application of a relay determines additional requirements exceeding those specified in this standard, the relay should be assessed in line with this application in accordance with the relevant IEC standard(s) (e.g. IEC 60730-1, IEC 60335-1, IEC 60950-1).

1DV.1 D2 ***Modification to Clause 1 by adding the following:***

1DV.1.1 In Canada, this Standard applies to the safety of such equipment designed and constructed for installation and use in accordance with CSA C22.1, Canadian Electrical Code, Part I.

1DV.1.2 In Canada, general requirements applicable to this standard are provided in CSA C22.2 No. 0.

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2DV D2 ***Modify Clause 2 by adding the following:***

For a list of normative standards, see Annex DVA, Table DVA.1 and Table DVA.2 for normative references. See Annex DVB, Table DVB.1 for a list of normative component standards.

ASTM E230/E230M, ***Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples***

IEC 60038:2009, *IEC standard voltages*

IEC 60050 (all parts), *International Electrotechnical Vocabulary*
(available at http://www.electropedia.org)

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-17:1994, *Basic environmental testing procedures – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60079-15:2010, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

IEC 60099-1, *Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems*[1]

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60364-4-44:2007, *Low voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60417, *Graphical symbols for use on equipment*
(available at http://www.graphical-symbols.info/equipment)

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

IEC 60664-3:2003, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60664-4:2005, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

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IEC 60664-5:2007, *Insulation coordination for equipment within low-voltage systems – Part 5: Comprehensive method for determining clearances and creepage distances equal to or less than 2 mm*

IEC 60695-2-10:2013, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*[2]

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

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

IEC 60695-10-2:2003, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test*

IEC 60721-3-3:1994, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weatherprotected locations*
IEC 60721-3-3:1994/AMD 1:1995
IEC 60721-3-3:1994/AMD 2:1996

IEC 60999-1:1999, *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)*

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

IEC 61760-1:2006, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*

IEC 61984:2008, *Connectors – Safety requirements and tests*

[1] This publication was withdrawn.

[2] This first edition has been replaced in 2014 by a second edition IEC 60695-2-11:2014, Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-444 and the following apply.

An alphabetical list of terms can be found at the end of this standard.

NOTE In the text of this standard, the term *relay* is used instead of *elementary relay* to improve the readability.

3.1 Terms and definitions related to general terms

3.1.1
marking
identification of a relay which, when completely given to the manufacturer of this relay, allows the unambiguous indication of its electrical, mechanical, dimensional and functional parameters

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EXAMPLE Through the indication of the trade mark and the type designation on the relay, all relay-specific data can be derived from the type code.

3.1.2
intended use
use of a relay for the purpose for which it was made, and in the manner intended by the manufacturer

3.1.3
relay technology categories
categories of relays, based upon environmental protection

Note 1 to entry: Six categories are in use (RT 0 to RT V).

[SOURCE: IEC 60050-444:2002, 444-01-11]

3.1.4
pulse width modulation
PWM
pulse time modulation in which the pulse duration varies in accordance with a given function of the value of the modulating signal

[SOURCE: IEC 60050-702:1992, 702-06-57]

3.1.5
existing design
design which was already approved by the preceding Edition of this standard

3.1.6
hazard
potential source of harm

Note 1 to entry: Relevant hazards taken into account in this standard are heating, electrical shock, ignition and foreseeable misuse before the end of life.

3.1.7
type test
test of one or more devices made to a certain design to show that the design meets certain specifications

3.1.8
routine test
test to which each individual device is subjected during and/or after manufacture to ascertain whether it complies with certain criteria

3.1.9
sampling test
test on a number of devices taken at random from a batch

3.2 Terms and definitions of relay types

3.2.1
electrical relay
device designed to produce sudden and predetermined changes in one or more output circuits when certain conditions are fulfilled in the electric input circuits controlling the device

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Note 1 to entry: For the purpose of this standard, output circuits are contact circuits.

Note 2 to entry: For the purpose of this standard, the term “coil” is used to denote “input circuit”, although other types of input circuits are possible.

[SOURCE: IEC 60050-444:2002, 444-01-01]

3.2.2
all-or-nothing relay
electrical relay, which is intended to be energized by a quantity, the value of which is either within its operative range or effectively zero

Note 1 to entry: "All-or-nothing relays" include both "elementary relays" and "time relays".

[SOURCE: IEC 60050-444:2002, 444-01-02]

3.2.3
elementary relay
all-or-nothing relay which operates and releases without any intentional time delay

[SOURCE: IEC 60050-444:2002, 444-01-03]

3.2.4
electromechanical relay
electrical relay in which the intended response results mainly from the movement of mechanical elements

[SOURCE: IEC 60050-444:2002, 444-01-04]

3.2.5
monostable relay
electrical relay which, having responded to an energizing quantity and having changed its condition, returns to its previous condition when that quantity is removed

[SOURCE: IEC 60050-444:2002, 444-01-07]

3.2.6
bistable relay
electrical relay which, having responded to an energizing quantity and having changed its condition, remains in that condition after the quantity has been removed; a further appropriate energization is required to make it change its condition

Note 1 to entry: Bistable relays are also called latching relays.

SOURCE: IEC 60050-444:2002, 444-01-08

3.3 Terms and definitions related to conditions and operations

3.3.1
release condition
for a monostable relay, specified condition of the relay when it is not energized; for a bistable relay, one of the specified conditions, as declared by the manufacturer

Note 1 to entry: See Figure A.1.

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[SOURCE: IEC 60050-444:2002, 444-02-01]

3.3.2
operate condition
for a monostable relay, specified condition of the relay when it is energized by the specified energizing quantity and has responded to that quantity; for a bistable relay, the condition other than the release condition as declared by the manufacturer

Note 1 to entry: See Figure A.1.

[SOURCE: IEC 60050-444:2002, 444-02-02]

3.3.3
operate, verb
change from the release condition to the operate condition

Note 1 to entry: See Figure A.1.

[SOURCE: IEC 60050-444:2002, 444-02-04]

3.3.4
release, verb
for a monostable relay, change from the operate condition to the release condition

Note 1 to entry: See Figure A.1.

[SOURCE: IEC 60050-444:2002, 444-02-05]

3.3.5
reset, verb
for a bistable relay, change from the operate condition to the release condition

[SOURCE: IEC 60050-444:2002, 444-02-06]

3.3.6
cycle
operation and subsequent release/reset

[SOURCE: IEC 60050-444:2002, 444-02-11]

3.3.7
frequency of operation
number of cycles per unit of time

[SOURCE: IEC 60050-444:2002, 444-02-12]

3.3.8
continuous duty
duty in which the relay remains energized for a period long enough to reach thermal equilibrium

[SOURCE: IEC 60050-444:2002, 444-02-13]

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3.3.9
intermittent duty
duty in which the relay performs a series of identical cycles, the durations in the energized and unenergized conditions being specified; the duration of energization of the relay is such as will not permit the relay to reach thermal equilibrium

[SOURCE: IEC 60050-444:2002, 444-02-14, modified – modification of the definition]

3.3.10
temporary duty
duty in which the relay remains energized for insufficient duration to reach thermal equilibrium, the time intervals of energization being separated by unenergized time intervals of duration sufficient to restore equality of temperature between the relay and the surrounding medium

[SOURCE: IEC 60050-444:2002, 444-02-16]

3.3.11
duty factor
ratio of the duration of energization to the total period in which intermittent or continuous or temporary duty takes place

Note 1 to entry: The duty factor can be expressed as a percentage of the total period.

[SOURCE: IEC 60050-444:2002, 444-02-15]

3.3.12
ambient temperature
temperature(s) prescribed for the air surrounding the relay under certain conditions, when the relay is mounted as indicated by the manufacturer

[SOURCE: IEC 60050-444:2002, 444-03-18, modified – modification of the definition and addition of a new note]

3.3.13
thermal equilibrium
variation of less than 1 K between any two out of three consecutive measurements made at an interval of 5 min

3.3.14
rated value
value of a quantity used for specification purposes, established for a specific set of operating conditions

[SOURCE: IEC 60050-444:2002, 444-02-18, modified – modification of the definition]

3.3.15
test value
value of a quantity for which the relay shall comply with a specified action during a test

[SOURCE: IEC 60050-444:2002, 444-02-20]

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3.3.16
mechanical endurance
number of cycles under specified conditions with unloaded contact(s)

[SOURCE: IEC 60050-444:2002, 444-07-10, modified – modification of the definition]

3.4 Terms and definitions of operating values

3.4.1
energizing quantity
electrical quantity which, when applied to the coil(s) of a relay under specified conditions, enables it to fulfil its purpose

Note 1 to entry: For relays, the energizing quantity is usually a voltage. Therefore, the input voltage as energizing quantity is used in the definitions given in 3.4. Where a relay is energized by a given current instead, the respective terms and definitions apply with "current" used instead of "voltage".

[SOURCE: IEC 60050-444:2002, 444-03-01, modified – modification of the definition]

3.4.2
operate voltage
set voltage
value of the coil voltage at which a relay operates

Note 1 to entry: "Set voltage" applies to bistable relays only.

[SOURCE: IEC 60050-444:2002, 444-03-06, modified – modification of the term and the definition]

3.4.3
operate voltage
$\boldsymbol{U_1}$
value of the coil voltage at which a relay operates, having previously been energized at that same voltage

Note 1 to entry: Thermal equilibrium has to be achieved.

3.4.4
limiting voltage
$\boldsymbol{U_2}$
value of the coil voltage, taking into account the effect of heating due to the power dissipated by the coil(s), which when exceeded may result in a relay failure caused by thermal overload

Note 1 to entry: Thermal equilibrium has to be achieved.

3.4.5
operative range
range of values of coil voltage for which a relay is able to perform its specified function

[SOURCE: IEC 60050-444:2002, 444-03-05, modified – modification of the term and the definition]

3.4.6
release voltage
value of the coil voltage at which a monostable relay releases

[SOURCE: IEC 60050-444:2002, 444-03-08, modified – modification of the definition]

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3.5 Terms and definitions related to contacts

For a.c., r.m.s. values for voltage and current are specified, unless otherwise indicated.

3.5.1
contact
arrangement of contact members, with their insulation, which close or open their contact circuit by their relative movement

Note 1 to entry: See Figure A.2.

[SOURCE: IEC 60050-444:2002, 444-04-03]

3.5.2
contact set
combination of contacts within a relay, separated by their insulation

Note 1 to entry: See Figure A.2

[SOURCE: IEC 60050-444:2002, 444-04-04]

3.5.3
contact gap
gap between the contact points when the contact circuit is open

[SOURCE: IEC 60050-444:2002, 444-04-09]

3.5.4
make contact
contact which is closed when the relay is in its operate condition and which is open when the relay is in its release condition

[SOURCE: IEC 60050-444:2002, 444-04-17]

3.5.5
break contact
contact which is open when the relay is in its operate condition and which is closed when the relay is in its release condition

[SOURCE: IEC 60050-444:2002, 444-04-18]

3.5.6
change-over contact
combination of two contact circuits with three contact members, one of which is common to the two contact circuits; such that when one of these contact circuits is open, the other is closed

[SOURCE: IEC 60050-444:2002, 444-04-19]

3.5.7
switching voltage
voltage between the contact members before closing or after opening of a relay contact

Note 1 to entry: The term “contact voltage” (see IEC 60050-444:2002, 444-04-25) has been replaced by “switching voltage”. The definition remains unchanged, however.

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3.5.8
contact current
electric current which a relay contact carries before opening or after closing

[SOURCE: IEC 60050-444:2002, 444-04-26]

3.5.9
switching current
electric current which a relay contact makes and/or breaks

[SOURCE: IEC 60050-444:2002, 444-04-27]

3.5.10
limiting continuous current
greatest value of electric current which a closed contact is capable of carrying continuously under specified conditions

[SOURCE: IEC 60050-444:2002, 444-04-28, modified – modification of the term and the definition]

3.5.11
micro-interruption
interruption of a circuit by contact separation which does not provide full-disconnection or micro-disconnection

Note 1 to entry: There are no dielectric strength or dimensional requirements for the contact gap.

[SOURCE: IEC 60730-1, 2.4.4, modified– modification of the definition]

3.5.12
micro-disconnection
adequate contact separation in at least one contact so as to provide functional security

Note 1 to entry: There is a requirement for the dielectric strength of the contact gap but no dimensional requirement.

[SOURCE: IEC 60730-1:2013, 2.4.3, modified – modification of the term and definition]

3.5.13
full-disconnection
contact separation for the disconnection of conductors so as to provide the equivalent of basic insulation between those parts intended to be disconnected

Note 1 to entry: There are dielectric strength and dimensional requirements.

[SOURCE: IEC 60730-1:2013, 2.4.2, modified – modification of the term and definition]

3.5.14
failure
termination of the ability of an item to perform a required function as defined in the failure criteria

Note 1 to entry: For the purpose of this standard, items are elementary relays.

[SOURCE: IEC 60050-191:1990, 191-04-01, modified – modification of the definition]

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3.5.15
failure criteria
specified conditions to judge if a fault or malfunction is a failure

3.5.16
malfunction
event when an item does not perform an expected function

3.5.17
fault
deviation of the existing condition from the expected condition

3.5.18
contact failure
occurrence of break and/or make malfunctions of a contact under test, exceeding a specified number

3.5.19
failure to break
current flows although it should not

Note 1 to entry: This could be a contact welding/sticking as well as a delayed contact operate or release.

3.5.20
failure to make
no sufficient contact is ensured

Note 1 to entry: This could be a not acceptable or excessive contact resistance as well a bouncing of the contact due to the lost of overtravel.

3.5.21
electrical endurance
number of cycles without contact failure under specified conditions, with loaded contacts

3.5.22 **end of life**
the point at which the physical relay conditions for operate and release can no longer be ensured after an unspecified number of cycles.

Note 1 to entry: The intended use of electromechanical relays is to switch loads depending on the control circuit. The relay will follow this request until the mechanical and/or electrical breakdown of the relay (the relay is per definition a wear device).

Note 2 to entry: Using relays after end of life could cause hazards.

3.6 Terms and definitions related to accessories

3.6.1
manual operation
manual movement of the actuating member of the relay

3.6.2
actuating member
part which is pulled, pushed, turned or otherwise operated in order to initiate a function

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3.7 Terms and definitions related to insulation

3.7.1
functional insulation
insulation between conductive parts which is necessary only for the proper functioning of the relay

[SOURCE: IEC 60664-1:1992, 1.3.17.1, modified – modification of the definition]

3.7.2
basic insulation
insulation of hazardous-live-parts which basic protection against electric shock

Note 1 to entry: Basic insulation does not necessarily include insulation used exclusively for functional purposes.

[SOURCE: IEC 60664-1:2002, 3.17.2, modified – modification of the definition]

3.7.3
supplementary insulation
independent insulation applied in addition to basic insulation, in order to provide protection against electric shock in the event of a failure of basic insulation

[SOURCE: IEC 61140:2001, 3.10.2, modified – modification of the definition]

3.7.4
double insulation
insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 61140:2001, 3.10.3]

3.7.5
reinforced insulation
insulation of hazardous-live-parts which provides a degree of protection against electric shock equivalent to double insulation

[SOURCE: IEC 61140:2001, 3.10.4, modified – modification of the definition]

3.7.6
conductive part
part which is capable of conducting electric current, although it may not necessarily be used for this purpose

3.7.7
live part
conductor or conductive part intended to be energized in normal operation, including a neutral conductor, but by convention not a PEN conductor

Note 1 to entry: A PEN conductor combines the functions of both a protective earthing conductor and a neutral conductor.

[SOURCE: IEC 60050-195:1998, 195-02-19, modified – modification of the definition]

3.7.8
clearance
shortest distance in air between two conductive parts, or between a conductive part and the accessible surface of a relay

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Note 1 to entry: An example for an accessible surface is the actuating member of a relay used for manual operation.

[SOURCE: IEC 60664-1:2007, 3.2, modified – modification of the definition]

3.7.9
solid insulation
solid insulating material interposed between two conductive parts

[SOURCE: IEC 60664-1:2007, 3.4]

3.7.10
creepage distance
shortest distance along the surface of the insulating material between two conductive parts

[SOURCE: IEC 60664-1:2007, 3.3, modified – modification of the definition]

3.7.11
tracking
progressive degradation of a solid insulating material by local discharges to form conducting or partially conducting paths

Note 1 to entry: Tracking usually occurs due to surface contamination.

[SOURCE: IEC 60050-212:2010, 212-11-56, modified – modification of the definition]

3.7.12
proof tracking index
PTI
numerical value of the proof voltage expressed in volts which a material can withstand without tracking under specified test conditions

[SOURCE: IEC 60050-212:2010, 212-11-60, modified – modification of the definition]

3.7.13
pollution
any addition of foreign matter, solid, liquid, or gaseous that can result in a reduction of electric strength or surface resistivity of the insulation

[SOURCE: IEC 60664-1:2007, 3.11]

3.7.14
pollution degree
numeral characterizing the expected pollution of the micro-environment

Note 1 to entry: Pollution degrees 1, 2 and 3 are used, see Annex H.

[SOURCE: IEC 60664-1:2007, 3.13]

3.7.15
micro-environment
immediate environment of the insulation which particularly influences the dimensioning of the creepage distances

[SOURCE: IEC 60664-1:2007, 3.12.2]

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