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Edition 2.0 2006-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electromechanical elementary relays –
Part 7: Test and measurement procedures

Relais électromécaniques élémentaires –
Partie 7: Méthodes d'essai et de mesure

IEC 61810-7:2006-03(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL ELEMENTARY RELAYS –

Part 7: Test and measurement procedures

FOREWORD

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International Standard IEC 61810-7 has been prepared by IEC technical committee 94: All-or-nothing electrical relays.

This bilingual version (2014-05) corresponds to the English version, published in 2006-03.

This second edition cancels and replaces the first edition published in 1997. This second edition constitutes a technical revision.

This new edition has been revised in order to

– update all normative references,
– adapt its contents to the newest issues of the other parts of this series of basic relay standards (IEC 61810-1 and IEC 61810-2),
– establish coherence with other IEC standards (for example of the IEC 60068-2 series),
– improve test and measurement procedures where appropriate,
– delete those tests no longer used in case of elementary relays for industrial application.

The text of this standard is based on the following documents:

FDIS	Report on voting
94/226/FDIS	94/231/RVD

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

The French version of this standard has not been voted upon.

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

IEC 61810 consists of the following parts, under the general title *Electromechanical elementary relays:*

Part 1: General and safety requirements

Part 2: Reliability

Part 7: Test and measurement procedures

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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- withdrawn;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.

ELECTROMECHANICAL ELEMENTARY RELAYS –

Part 7: Test and measurement procedures

1 Scope

This part of IEC 61810 states the test and measurement procedures for electromechanical elementary relays. It covers basic considerations which are, in general, common to all types of electromechanical elementary relays. Supplementary requirements may be necessitated by specific designs or application.

The test and measurement procedures of this standard are described as individual provisions covering a specific requirement. When combining them in a test programme, care must be taken (for example by suitable grouping of tested relays) to ensure that preceding tests do not devalue subsequent ones.

Where in this standard the term "specified" is used, this means a prescription in the appropriate documentation for the relay, for example manufacturer's data sheet, test specification, customer detail specification. For application within the IECQ system such prescriptions are contained in the detail specification as defined in Clause A.7 of QC 001001.

NOTE 1 To improve the readability of this standard, the term "relay" is generally used in place of "electromechanical elementary relay".

NOTE 2 Requirements and tests related to the type testing of electromechanical elementary relays are contained in IEC 61810-1. For that purpose, the generally described test and measurement procedures of this standard have been prescribed in a more restricted and stringent form in IEC 61810-1.

NOTE 3 Standards covering relays subjected to quality assessment in accordance with IECQ are compiled in the IEC 61811 series of publications.

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 60068-2-1:1990, *Environmental testing – Part 2: Tests – Tests A: Cold*
Amendment 1 (1993)
Amendment 2 (1994)

IEC 60068-2-2:1974, *Environmental testing – Part 2: Tests – Tests B: Dry heat*
Amendment 1 (1993)
Amendment 2 (1994)

IEC 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-7:1983, *Environmental testing – Part 2: Tests – Test Ga: Acceleration, steady state*
Amendment 1 (1986)

IEC 60068-2-10:2005, *Environmental testing – Part 2: Tests – Test J and guidance: Mould growth*

IEC 60068-2-11:1981, *Environmental testing – Part 2: Tests – Test Ka: Salt mist*

IEC 60068-2-13:1983, *Environmental testing – Part 2: Tests – Test M: Low air pressure*

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests – Test N: Change of temperature*
Amendment 1 (1986)

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

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*
Amendment 2 (1987)

IEC 60068-2-21:1999, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60068-2-29:1987, *Environmental testing – Part 2: Tests – Test Eb and guidance: Bump*

IEC 60068-2-30:2005, *Environmental testing – Part 2: Tests – Test Db: Damp heat, cyclic (12 + 12-hour cycle)*

IEC 60068-2-42:2003, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-43:2003, *Environmental testing – Part 2-43: Tests – Test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-45:1980, *Environmental testing – Part 2: Tests – Test XA and guidance: Immersion in cleaning solvents*
Amendment 1 (1993)

IEC 60068-2-58:2004, *Environmental testing – Part 2-58: Tests – Test Td – Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-64:1993, *Environmental testing – Part 2: Test methods – Test Fh: Vibration, broad-band random (digital control) and guidance*

IEC 60068-2-68:1994, *Environmental testing – Part 2: Tests – Test L: Dust and sand*

IEC 60068-2-78:2001, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60512-7: 1993, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods – Part 7: Mechanical operating tests and sealing tests*

IEC 60695-2 (all parts), *Fire hazard testing – Part 2: Test methods*

IEC 60695-2-10:2000, *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*

IEC 60695-2-12:2000, *Fire hazard testing – Part 2-12: Glowing/hot wire based test methods – Glow-wire flammability test method for materials*

IEC 60695-2-13:2000, *Fire hazard testing – Part 2-13: Glowing/hot wire based test methods – Glow-wire ignitability test method for materials*

IEC 60695-11-5:2004, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

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 61210:1993, *Connecting devices – Flat quick-connect terminations for electric copper conductors – Safety requirements*

IEC 61180-1:1992, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 61180-2:1994, *High-voltage test techniques for low-voltage equipment – Part 2: Test equipment*

IEC 61672-1:2002, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61810-1:2004, *Electromechanical elementary relays – Part 1: General and safety requirements*

IECQ QC 001001:2000, *IEC Quality Assessment System for Electronic Components (IECQ) – Basic Rules*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Types of relays

3.1.1
electromechanical relay
electrical relay in which the intended response results mainly from the movement of mechanical elements

[IEV 444-01-04]

3.1.2
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

[IEV 444-01-02]

3.1.3
elementary relay
all-or-nothing relay which operates and releases without any intentional time delay

[IEV 444-01-03]

3.1.4
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

[IEV 444-01-07]

3.1.5
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

[IEV 444-01-08]

3.1.6
polarized relay
electrical relay, the change of condition of which depends upon the polarity of its DC energizing quantity

[IEV 444-01-09]

3.1.7
non-polarized relay
electrical relay, the change of condition of which does not depend upon the polarity of its energizing quantity

[IEV 444-01-10]

3.2 Types of relays, based upon environmental protection (relay technology RT)

3.2.1
RT 0 unenclosed relay
relay not provided with a protective case

3.2.2
RT I dust protected relay
relay provided with a case which protects its mechanism from dust

3.2.3
RT II flux proof relay
relay capable of being automatically soldered without allowing the migration of solder fluxes beyond the intended areas

NOTE Where an enclosed construction is used, venting to the outside atmosphere is permissible.

3.2.4
RT III wash tight relay
relay capable of being automatically soldered and subsequently undergoing a washing process to remove flux residues without allowing the ingress of flux or washing solvents

NOTE In service, this type of relay is sometimes vented to the atmosphere after the soldering or washing process.

3.2.5
RT IV sealed relay
relay provided with a case which has no venting to the outside atmosphere, and having a time constant better than 2×10^4 s (see IEC 60068-2-17)

3.2.6
RT V hermetically sealed relay
sealed relay having an enhanced level of sealing, assuring a time constant better than 2×10^6 s (see IEC 60068-2-17)

3.3 Functions of a relay

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 conditions, as declared by the manufacturer

[IEV 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

[IEV 444-02-02]

3.3.3
operate (verb)
change from the release condition to the operate condition

[IEV 444-02-04]

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

[IEV 444-02-05]

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

[IEV 444-02-06]

3.3.6
change over (verb)
for a monostable relay, operate or release; for a bistable relay, operate or reset

[IEV 444-02-07]

3.3.7
cycle (verb)
for a monostable relay, operate and then release or vice versa; for a bistable relay, operate and then reset or vice-versa

[IEV 444-02-08]

3.3.8
revert (verb)
for a specific type of polarized relay, release/reset again, or remain in the release condition, when supplied with a coil voltage in excess of that required for operation and of the same polarity as required for operation

[IEV 444-02-09, modified]

3.3.9
revert reverse (verb)
for a specific type of polarized bistable relay, operate again, or remain in the operate condition, when supplied with a coil voltage in excess of that required for resetting and of the same polarity as required for resetting

[IEV 444-02-10, modified]

3.4 Types of contacts

3.4.1
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

[IEV 444-04-17]

3.4.2
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

[IEV 444-04-18]

3.4.3
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

[IEV 444-04-19]

3.4.4
change-over make-before-break contact
change-over contact in which the make contact circuit closes before the break contact circuit opens

[IEV 444-04-20]

3.4.5
change-over break-before-make contact
change-over contact in which the break contact circuit opens before the make contact circuit closes

[IEV 444-04-21]

3.5 Prefixes for the values applicable to relays

Values may be defined as rated, actual (“just”), test (“must”) or characteristic value and identified as such by using one of these words as a prefix. The prefixes are also applicable to timing values.

3.5.1
rated value
value of a quantity used for specification purposes, established for a specified set of operating conditions of a relay

[IEV 444-02-18, modified]

3.5.2
actual (“just”) value
value of a quantity determined by measurement on a specific relay, during performance of a specified function

[IEV 444-02-21]

3.5.3
test (“must”) value
value of a quantity for which the relay shall comply with a specified action during a test

[IEV 444-02-20]

3.5.4
characteristic value
value of a quantity with which, in the initial condition of a relay or for a specified number of cycles as specified, the relay shall comply with a specified requirement

[IEV 444-02-19, modified]

3.6 Energization values

3.6.1
energizing quantity
electrical quantity which, when applied to the coil(s) of a relay under specified conditions, enables it to fulfil its purpose

[IEV 444-03-01, modified]

NOTE 1 For elementary relays, the energizing quantity is usually a voltage. Therefore, the input voltage as energizing quantity is used in the definitions given below. When a relay is energized by a given current instead, the respective terms and definitions apply with “current” used instead of “voltage”.

NOTE 2 The general term “input voltage” used in IEV Chapter 444 applies to all types of elementary relays (e.g. including solid-state relays). For electromechanical elementary relays the more specific term “coil voltage” has been chosen for the terms of 3.6, as in IEC 61810-1.

3.6.2
coil voltage
voltage applied as an energizing quantity

[IEV 444-03-03]

3.6.3
operative range
range of values of coil voltage for which a relay is able to perform its specified function

[IEV 444-03-05, modified]

NOTE For the following terms, refer also to Figures 3 to 7 which show the sequential functions of relays covered by the definitions.

3.6.4
magnetic preconditioning value
value of the coil voltage at which the relay attains a defined magnetic condition

[IEV 444-03-19]

NOTE 1 For polarized relays, distinction is made between preconditioning in forward (operate) direction, and preconditioning in reverse direction.

NOTE 2 For bistable relays, preconditioning may also be used to set the relay to a defined position.