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**Electromechanical all-or-nothing relays –
Part 50: Sectional specification – Electromechanical all-or-nothing telecom
relays of assessed quality**

**Relais électromécaniques de tout-ou-rien –
Partie 50: Spécification intermédiaire – Relais électromécaniques de tout-ou-rien
télécom sous assurance de la qualité**

1-50:2002

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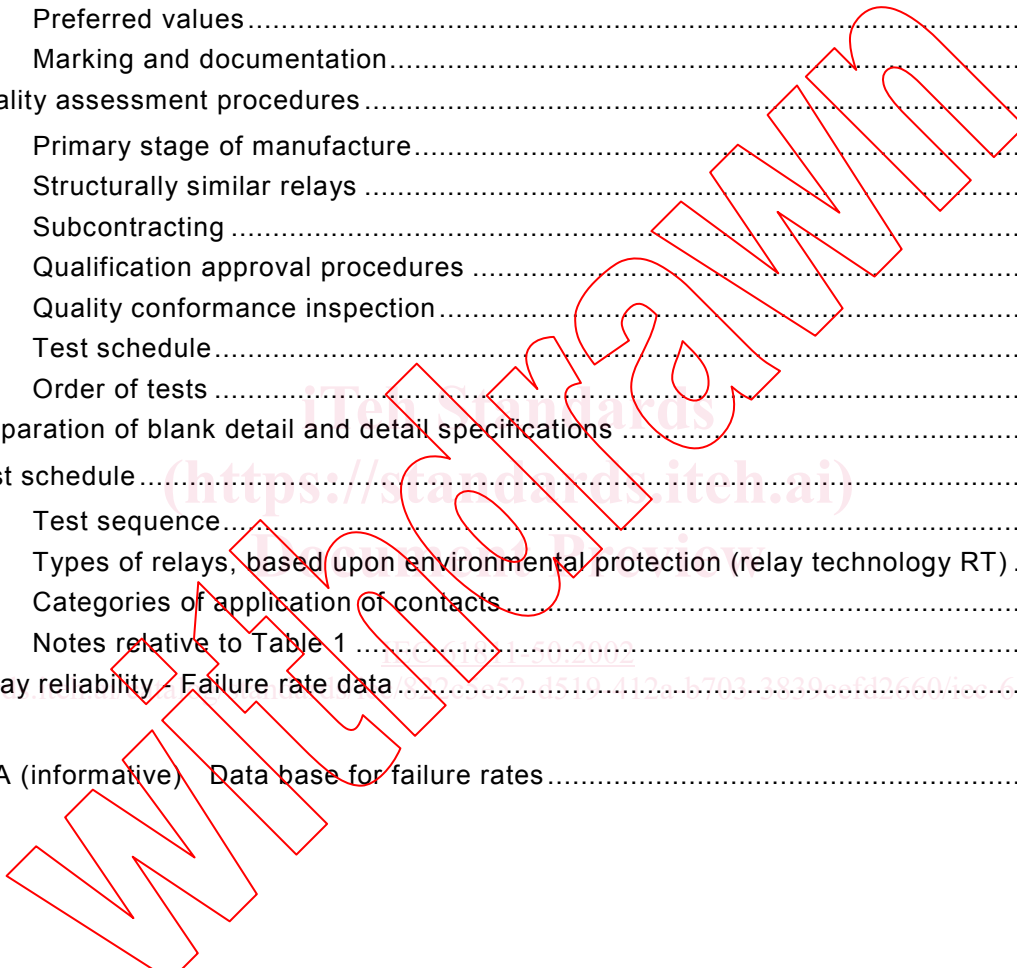
ICS 29.120.70

ISBN 978-2-8322-1547-0

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CONTENTS

FOREWORD.....	3
1 General.....	5
1.1 Scope.....	5
1.2 Normative references.....	5
1.3 Terms and definitions.....	6
1.4 Preferred values.....	7
1.5 Marking and documentation.....	8
2 Quality assessment procedures.....	9
2.1 Primary stage of manufacture.....	9
2.2 Structurally similar relays.....	9
2.3 Subcontracting.....	9
2.4 Qualification approval procedures.....	9
2.5 Quality conformance inspection.....	9
2.6 Test schedule.....	10
2.7 Order of tests.....	10
3 Preparation of blank detail and detail specifications.....	11
4 Test schedule.....	12
4.1 Test sequence.....	12
4.2 Types of relays, based upon environmental protection (relay technology RT).....	12
4.3 Categories of application of contacts.....	12
4.4 Notes relative to Table 1.....	13
5 Relay reliability - Failure rate data.....	13
Annex A (informative) Data base for failure rates.....	18



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL ALL-OR-NOTHING RELAYS –**Part 50: Sectional specification –
Electromechanical all-or-nothing telecom relays
of assessed quality**

FOREWORD

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International Standard IEC 61811-50 has been prepared by IEC technical committee 94: All-or-nothing electrical relays.

This bilingual version (2014-04) corresponds to the English version, published in 2002-03.

This second edition of IEC 61811-50 cancels and replaces the first edition published in 1997 and constitutes a technical revision.

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

FDIS	Report on voting
94/144/FDIS	94/158/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.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

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ELECTROMECHANICAL ALL-OR-NOTHING RELAYS –

Part 50: Sectional specification –

Electromechanical all-or-nothing telecom relays of assessed quality

1 General

1.1 Scope

This part of IEC 61811 is a sectional specification and applies to electromechanical all-or-nothing telecom relays of assessed quality. Relays according to this standard are provided for operation in telecommunication applications. However, as electromechanical all-or-nothing relays, they are also suitable for particular industrial and other applications.

This standard selects from IEC 61810-7 and other sources the appropriate methods of test to be used in detail specifications derived from this specification, and contains basic test schedules to be used in the preparation of such specifications. Detailed test schedules are contained in the blank detail specifications supplementary to this specification.

1.2 Normative references

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

IEC 60062:1992, *Marking codes for resistors and capacitors*

IEC 60255-23:1994, *Electrical relays – Part 23: Contact performance*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60695-2-2:1991, *Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test*

IEC 61709:1996, *Electronic components – Reliability – Reference conditions for failure rates and stress models for conversion*

IEC 61810-1:1998, *Electromechanical non-specified time all-or-nothing relays – Part 1: General requirements*

IEC 61810-5:1998, *Electromechanical non-specified time all-or-nothing relays – Part 5: Insulation co-ordination*

IEC 61810-7:1997, *Electromechanical all-or-nothing relays – Part 7: Test and measurement procedures*

IEC 61811-1:1999, *Electromechanical non-specified time all-or-nothing relays of assessed quality – Part 1: Generic specification*

QC 001002-3:1998, *Rules of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ) – Part 3: Approval Procedures*

ISO 8601:2000, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO 9001:2000, *Quality systems – Model for quality assurance in design, development, production, installation and servicing*

CECC 00016:1990, *Basic requirements for the use of statistical process control (SPC) in the CECC system*

CECC 00800:1986, *Code of practice on the use of the ppm approach in association with the CECC system*

1.3 Terms and definitions

For the purpose of this part of IEC 61811, the terms and definitions given in IEC 61810-7, as well as the following apply:

1.3.1 types of relays

types of relays as defined in IEC 61810-7

NOTE The most frequent types of electromechanical all-or-nothing telecom relays are the following ones:

- monostable: non-polarized;
- monostable: polarized;
- bistable: polarized.

1.3.2 types of contacts

a) change-over break-before-make contact

change-over contact, one contact circuit of which breaks before the other makes

b) change-over make-before-break contact

change-over contact, one contact circuit of which makes before the other breaks

1.3.3 contact fault and contact failure

a) contact fault due to contact-circuit resistance

the occurrence is assumed when the contact-circuit resistance of a closed contact exceeds the maximum value stated in the detail specification

b) contact fault due to non-opening of the contact circuit (e.g. contact sticking)

the occurrence due to the fact that the contact does not open is assumed when the resistance of an open contact assembly falls below the specified minimum value stated in the detail specification

c) contact failure

the occurrence is assumed when the number of faults due to contact-circuit resistance or/and of faults due to non-opening of the contact circuit exceeds the number of faults stated in the detail specification, with reference to a single tested contact

1.3.4

relay fault, relay failure and relay defect

a) **relay fault**

the state of a relay characterized by the inability to perform a required function. A fault persists for a limited time after which the relay recovers the ability to perform a required function without being subjected to any corrective maintenance

b) **relay failure**

failure occurs when the relay is unable to carry out its required function

c) **relay defect**

any deviation of a characteristic of a relay from the requirements

NOTE 1 The requirements may or may not be expressed in the form of a specification.

NOTE 2 A defect may or may not affect the ability of a relay to perform a required function.

d) **defective relay**

relay containing one or more defects

1.4 Preferred values

The following Subclauses contain preferred values applicable to electromechanical all-or-nothing telecom relays.

1.4.1 Rated coil voltages

Preferred values d.c.: 1,5; 3; 4,5; 5; 6; 9; 12; 24; 48 or 60 V.

1.4.2 Contact-circuit resistance

a) Preferred values in initial condition: maximum 50; 100 or 200 m Ω .

b) Preferred values during/after tests: maximum 0,5; 1; 5; 10; 20 or 100 Ω .

c) Preferred value for detecting faults due to non-opening of the contact circuit during tests: minimum 100 k Ω .

d) Voltage for detecting faults due to non-opening of the contact circuit during tests; preferred maximum values: 0,03; 5; 6; 12; 24; 48 or 60 V d.c.

e) Difference of contact-circuit resistance between different contact circuits in the same relay, preferred value: maximum 100 m Ω (initial condition).

1.4.3 Dielectric test

Preferred values in initial condition between opened contact circuits, between separate contact circuits, between contact circuits and coil(s), between all conductive parts and mass (if applicable) in accordance with IEC 61810-5.

a) Preferred voltages: 0,5; 0,8; 1,5; 2,5 kV a.c.

b) Preferred duration: 1 s or 60 s

1.4.4 Impulse voltage test

- a) Preferred voltages: 0,5; 1,0; 1,5; 2 or 2,5 kV.
- b) Preferred waveform: 0,5 μ s/700 μ s, 1,2 μ s/50 μ s or 10 μ s/700 μ s.
- c) Preferred number of pulses (alternate positive and negative pulses): 10.
- d) Preferred frequency of pulses: 2 or 4 pulses/min.

1.4.5 Insulation resistance

Preferred value: 1 000 M Ω at 500 V d.c. initial value.

1.4.6 Number of operations determining electrical endurance

Preferred values: 10 000; 20 000; 50 000; 100 000; 200 000; 500 000; 700 000; 1 000 000; 1 600 000; 2 000 000; 5 000 000; 10 000 000; 20 000 000 or 30 000 000.

1.4.7 Contact failure rate for test evaluation purposes

Preferred values: maximum 10^{-5} , 10^{-6} , 10^{-7} , 10^{-8} /contact/cycle

1.5 Marking and documentation

Relays and their package supplied in accordance with detail specifications covered by this sectional specification shall be marked as follows:

1.5.1 Marking of the relay

- a) Manufacturer's name, logo or trade mark.
- b) Relay type and variant code.
- c) Coded date of manufacture, in terms of year/week according to 1.5.3.
- d) IECQ in letters or IECQ mark of conformity.
- e) Identification of terminal No. 1.

1.5.2 Marking of the package

- a) Manufacturer's name, logo or trade mark.
- b) Relay type and variant code.
- c) Manufacturer's batch identification code.
- d) IECQ in letters or IECQ mark of conformity.
- e) Detail specification reference if not marked on the relay.
- f) Quantity.

1.5.3 Coded date of manufacture

The marking system shall use four figures as specified in 5.2 of IEC 60062. The first two figures shall be the last two figures of the year and the last two figures the numbering of the week (5.2.3.3 b) of ISO 8601, year and week in the current century, modified).

Example: Fifth week of 1994 = 9405.

If stated in the detail specification only, the basic format for a specific date in accordance with 5.2.1.3 a) of ISO 8601 shall be used. The first two figures shall be the last two figures of the year, the month is represented by the next two figures and the day of the month is represented by the last two figures.

Example: 20th June 1994 = 940620.

2 Quality assessment procedures

2.1 Primary stage of manufacture

The primary stage of manufacture is the first process subsequent to the manufacture of finished parts and subassemblies of the relay.

NOTE 1 A subassembly is understood to mean here the permanent assembly of two or more piece parts.

NOTE 2 Important manufacturing steps are as follows:

- a) fabrication, heat treatment and plating of the component parts of the relay;
- b) coil winding;
- c) assembling of the electrical and electromechanical parts;
- d) adjustment of the relay contacts, if applicable;
- e) high-temperature drying, gas backfilling and sealing of the relay, if applicable;
- f) final measurements and periodic inspection of test groups A to C.

2.2 Structurally similar relays

Relays are considered structurally similar if they have no differences in design other than:

- a) coil wire diameter and number of windings;
- b) types, numbers and material of contacts;
- c) rated coil and/or contact voltage(s);
- d) mounting and terminal variants within the limits prescribed in the detail specification;
- e) biasing of the input circuit parts.

2.3 Subcontracting

For subcontracting, see annex B to Clause 2 of QC 001002-3.

2.4 Qualification approval procedures

Qualification approval tests shall include all the tests prescribed in the detail specification and shall be performed by a schedule specifically prescribed in the detail specification.

The number of specimens for each subgroup is specified in the blank detail specification. As a general rule, a minimum of five specimens are required for each group of tests.

2.5 Quality conformance inspection

2.5.1 Formation of inspection lots

Inspection lots submitted to groups A and B acceptance tests shall be formed in accordance with 3.2.3 of QC 001002-3 and with the sampling plans and procedures given in IEC 60410,

except where production is too infrequent or too small for sampling plans to apply; in these cases inspection shall be 100 %.

When sampling is carried out in accordance with IEC 60410, the percent defective concept only shall be used. Stratified or representative sampling shall always be used to include all production lines and structurally similar relays in proportion to their respective quantities in the lot. Exceptions from proportionality may become necessary and shall be stated in the detail specification. Specimens shall be as representative as possible of the production.

The determination basis for the sample sizes from continuous production lines shall be stated in the blank detail specification.

2.5.2 Periodic inspection

Fixed sample sizes for group C inspection shall be taken from a lot (or lots) which has (have) passed groups A and B inspection during or at the end of the specified reference period.

2.6 Test schedule

2.6.1 Test sequence

A test sequence shall consist of all tests listed in the detail specification. Where appropriate, the reference number of the tests are those of the IEC 61810-7. Additional testing may be called for by the detail specification.

2.6.2 Groups A and B

The inspection level (IL) notation applies to all tests in one subgroup. A corresponding value/range of values of the acceptable quality level (AQL) shall be given in the blank detail specification, and the authority preparing detail specifications shall choose the appropriate value, which then applies to all tests in one subgroup.

Any given IL-AQL notations shall be interpreted so that the number of defectives allowable for acceptance is applicable separately to each test within a subgroup. However, the blank detail specification may prescribe this same IL for relays submitted to cumulative tests of the same subgroup.

2.6.3 Group C

The blank detail specification shall prescribe for each subgroup:

- a) periodicity of each subgroup. If the same periodicity is applicable to all subgroups, it shall be given at the beginning of the group test details;
- b) the minimum sample size for each test (or group of tests) performed with the same relays and the acceptable number of defectives.

2.7 Order of tests

Quality conformance inspection is divided into two parts: that carried out lot-by-lot, on which the release of the individual lots is based, and that carried out on a periodic basis, which contains the time-consuming and more expensive tests.

When several tests are subsequently to be carried out on any one specimen or number of specimens, the following order shall apply, unless otherwise prescribed in the detail specification:

- a) a 100 % test with a screening or sorting function shall always precede any other non-destructive (ND) or destructive (D) test;
- b) tests in groups other than a 100 % test shall be performed in the sequence given in the blank detail specification. It shall be ensured that the effects of earlier tests are not liable to invalidate the results of the later tests (see 4.1).

3 Preparation of blank detail and detail specifications

3.1 Blank detail specifications shall conform to the test schedules given in Table 1 of this specification and the related explanations.

3.2 Blank detail specifications shall give the following information or call for its inclusion in the detail specification:

- a) Identification of the detail specification.
- b) Identification of the relay and information on its applications; identification shall be provided by such properties as size, sealing, whether monostable or bistable, polarized or not, or other characteristics required for identification, contact operating range and temperature range.
- c) Outline drawing of the relay and key dimensions; variants, such as for terminals, may be given in an annex to the detail specification.
Customer packaging requirements for automatic handling.
- d) Reference data of the relay.
 - 1) A limited number of values is required on the front page to describe the overall performance of the relay.
 - 2) Full information in conformance with 1.4 and IEC 61810-1 shall be added on one of the subsequent pages. Rated values preferably should be those listed therein. Where tests refer to rated values, this shall be indicated with each test. Where tests are to be performed at other than rated values, the test values shall be indicated and clearly distinguished from the rated values.
- e) Normative references.

Reference shall be made to IEC 61810-7 and this sectional specification. When reference to further documents is necessary, such documents shall be listed with their full titles, year of edition and, unless common knowledge, the source from which they can be obtained.
- f) Assessment level.

Table 1 of this specification contains one test schedule. If additional tests not listed there have been added, this shall be stated.
- g) Periodicity of tests.
- h) Formation of inspection lots, if predictable in the sense of 2.6.1.
- i) Order of tests, if deviating from 2.7.
- j) General test conditions, if deviating from 3.5 of IEC 61810-7.
- k) Qualification approval test schedule.
- l) Quality conformance test schedule.

For each group of tests, the final measurements and post-test requirements specified in each of them may be summarized and stated at the end of the subgroup.

It shall be stated that samples subjected to destructive tests (D) shall not be released for delivery.

NOTE If application of SPC or ppm approach is required, this should be provided between the manufacturer and user of a relay in accordance with CECC 00800, CECC 00016 or ISO 9001.

- m) Specification of IL numbers (groups A and B) and sample sizes (group C).
- n) Specification of AQL numbers (groups A and B) and acceptable numbers of defectives (group C).
- o) Marking of package and/or relays beyond those listed in this specification, if necessary.
- p) Ordering information.

3.3 Additional information such as curves and drawings may be given in an annex to the detail specification. Such information is not required to be verified for test purposes.

3.4 When preparing blank detail or detail specifications, the following procedures should be followed:

- select the tests to be performed from Table 1 of this sectional specification;
- if necessary, add any other necessary tests, required or not specified in IEC 61810-7.

4 Test schedule

4.1 Test sequence

The order of tests in each subgroup of Table 1, and in the derived schedule in any corresponding blank detail specification, is mandatory unless a specific statement to the contrary is given. The sealing test shall always be the final test.

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

RT 0	unenclosed relay
RT I	dust-protected relay
RT II	flux-proof relay
RT III	wash-tight relay
RT IV	sealed relay
RT V	hermetically sealed relay

The definitions of protection and sealing are defined in 2.2 of IEC 61810-7.

4.3 Categories of application of contacts

CA 0	30 mV max./10 mA max.
CA 1	30 mV to 60 V/10 mA to 0,1 A
CA 2	5 V to 250 V/0,1 A to 1 A
CA 3	5 V to 600 V/0,1 A to 100 A.

The definitions of contact application are defined in 2.8 of IEC 61810-7.

The actual power rating of the contacts at minimum and maximum loads and the required number of switched cycles shall be defined in the detail specification (see 4.4, note 3).