

INTERNATIONAL STANDARD

CONSOLIDATED VERSION

**Electromechanical telecom elementary relays of assessed quality -
Part 1: Generic specification and blank detail specification**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

Electromechanical telecom elementary relays of assessed quality - Part 1: Generic specification and blank detail specification

FOREWORD

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

IEC 61811-1 edition 2.2 contains the second edition (2015-01) [documents 94/379/FDIS and 94/383/RVD], its amendment 1 (2025-12) [documents 94/1172/FDIS and 94/1180/RVD] and its amendment 2 (2026-07) [documents 94/1175/CDV and 94/1207A/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 61811-1 has been prepared by IEC technical committee 94: All-or-nothing electrical relays.

This second edition of IEC 61811-1 cancels and replaces

- IEC 61811-1 published in 1999,
- IEC 61811-10 published in 2002,
- IEC 61811-11 published in 2002,
- IEC 61811-50 published in 2002,
- IEC 61811-51 published in 2002,
- IEC 61811-52 published in 2002,
- IEC 61811-53 published in 2002,
- IEC 61811-54 published in 2002,
- IEC 61811-55 published in 2002,

and constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous editions:

- a) to get one document for telecom relays;
- b) update all relevant references;

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

FDIS	Report on voting
94/379/FDIS	94/383/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.

A list of all parts in the IEC 61811 series, published under the general title *Electromechanical telecom elementary relays of assessed quality*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

This publication was drafted in accordance with ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document and its amendments 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, or
- revised.

1 Scope

This part of IEC 61811 applies to electromechanical telecom elementary relays. Relays according to this standard are provided for the operation in telecommunication applications. However, as electromechanical elementary relays, they are also suitable for particular industrial and other applications.

This standard selects from IEC 61810 series 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 in accordance with this standard.

Detailed test schedules are contained in the detail specifications.

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.

IEC 60062:2004, *Marking codes for resistors and capacitors*

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

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

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

IEC 61810 (all parts), *Electromechanical elementary relays*

IEC 61810-1:2008, *Electromechanical elementary relays – Part 1: General requirements*

IEC 61810-2:2011, *Electromechanical elementary relays – Part 2: Reliability*

IEC 61810-7:2006, *Electromechanical elementary relays – Part 7: Test and measurement procedures*

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61810 series, as well as the following apply.

3.1 Type of relays

The most frequent types of electromechanical telecom elementary relays are defined in 3.1.1, 3.1.2, 3.1.3 and 3.1.4.

3.1.1

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.

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

3.1.2

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]

3.1.3

non-polarized relay

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

[SOURCE: IEC 60050-444:2002, 444-01-10]

3.1.4

polarized relay

polarized elementary relay

electrical relay, the change of condition of which depends upon the polarity of its d.c. energizing quantity

[SOURCE: IEC 60050-444:2002, 444-01-09; modified – In the definition, "elementary relay" has been replaced by "electrical relay".]

3.2 Types of contacts

3.2.1

change-over break-before-make contact

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

[SOURCE: IEC 60050-444:2002, 444-04-21, modified – The definition has been reworded.]

3.2.2

change-over make-before-break contact

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

[SOURCE: IEC 60050-444:2002, 444-04-20, modified – The definition has been reworded.]

3.3 Contact fault and contact failure

3.3.1

failure to make

failure caused when no sufficient contact is ensured

Note 1 to entry: This could be a not acceptable or excessive contact resistance exceeds the maximum value stated in the detail specification as well a bouncing of the contact due to the lost of overtravel.

3.3.2

failure to break

failure caused when the current flows although it should not

Note 1 to entry: For example, This could be a contact welding/sticking as well as a delayed contact operate or release contact. Also, it is assumed that the contact does not open, when the resistance of an open contact assembly falls below the specified minimum value stated in the detail specification

3.3.3

malfunction

single event when an item does not perform a required function

3.3.4

contact failure

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

3.4 Relay malfunction, relay failure

3.4.1

relay malfunction

the state of a relay characterized by the inability to perform a required function

Note 1 to entry: 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.

3.4.2

failure

termination of the ability of an item to perform a required function

[SOURCE:IEC 60050-191:1990, 191-04-01]

3.5 Relay construction types

3.5.1

type 0

non-standardized types and construction

3.5.2

type 1

two change-over contacts, 20 mm × 10 mm base

3.5.3

type 2

two change-over contacts, 14 mm × 9 mm base

3.5.4

type 3

two change-over contacts, 15 mm × 7,5 mm base

3.5.5

type 4

two change-over contacts, 11 mm × 7,5 mm (max.) base

3.5.6

type 5

two change-over contacts, 9,1 mm × 4,9 mm (max.) base

3.6 Inspection level and sample size

3.6.1

IL

Special Inspection Level in accordance to the ISO 2859 series

3.6.2

AQL

Acceptance Quality Limit in accordance to the ISO 2859 series

3.6.3

Lot-by-lot

Period: inspection lot refers to the production volume of not more than one week

4 Rated values

4.1 General

The following subclauses contain preferred values applicable to electromechanical telecom elementary relays.

4.2 Rated coil voltages

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

4.3 Contact-circuit resistance

- Preferred values in initial condition: maximum 50 m Ω ; 100 m Ω or 200 m Ω .
- Preferred values during/after tests: maximum 0,5 Ω ; 1 Ω ; 5 Ω ; 10 Ω ; 20 Ω or 100 Ω .
- Preferred value for detecting faults due to non-opening of the contact circuit during tests: minimum 100 k Ω .
- Voltage for detecting faults due to non-opening of the contact circuit during tests; preferred maximum values: 0,03 V; 5 V; 6 V; 12 V; 24 V; 48 V or 60 V d.c.
- Difference of contact-circuit resistance between different contact circuits in the same relay, preferred value: maximum 100 m Ω (initial condition).

4.4 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 61810-1.

- Preferred voltages: 0,5 kV; 0,8 kV; 1,5 kV; 2,5 kV a.c.
- Preferred duration: 1 s or 60 s

4.5 Impulse voltage test

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

4.6 Insulation resistance

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

4.7 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.

4.8 Contact failure rate for test evaluation purposes

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

5 Marking and documentation**5.1 General**

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

5.2 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 5.4.

5.3 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) Detail specification reference if not marked on the relay.
- e) Quantity.

5.4 Coded date of manufacture

The marking system shall use four figures as specified in 6.2 of IEC 60062:2004. The first two figures shall be the last two figures of the year and the last two figures the numbering of the week.

EXAMPLE Fifth week of 1994 = 9405.

If stated in the detail specification only, 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.

6 Preparation of blank detail and detail specifications

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

The blank specification as given in Annex C shall be used for the preparation and characteristic values of the relay shall be included as given in Annex B. The values shall be adjusted by the manufacturer as appropriate.

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 Clause 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 series. 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 7.4.9 and 8.1.

i) Order of tests, if deviating from 8.4.

j) General test conditions, if deviating from 4.5 of IEC 61810-7:2006.

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.

If application of SPC or ppm approach is required, this should be provided the manufacturer.

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

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.

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.

Examples for front pages of detail specifications are given in Annex C.

7 Quality assessment procedures

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

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.

7.2 Structurally similar relays

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

- a) wire diameter and 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 data sheet or specification.
- e) biasing of the input circuit parts.

7.3 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.

7.4 Quality conformance inspection

7.4.1 Grouping of tests

7.4.1.1 General

The purpose of grouping tests is to combine in one group all those tests which are of equal importance to the assessment of the usefulness of the relay. Therefore, each test in the same subgroup gets the same inspection level and acceptable quality level range, and therefore further criteria for the allocation of tests to a group are the destructiveness of the test, the duration of the test and the relation to the fabrication or design.

The frequency of testing takes account of the complexity, duration and overall cost of the test, and the effect of releasing non-conforming relays.

Characteristics tested at the same frequency and having similar importance to the function of the relay are combined into the same subgroup.

7.4.1.2 Division into groups (see Annex D)

Lot-by-lot tests are divided into two groups.

- a) Group A, covering the visual and dimensional inspection of the relays and non-destructive short-duration electrical and mechanical test procedures which are employed to assess the principal characteristics of the relays determined mainly by the fabrication process, as those which are of a design nature and of vital importance.
- b) Group B, covering both destructive and non-destructive test procedures, with a duration of up to about one week, which are employed to assess the characteristics of the relays determined mainly by the fabrication process, as those which are of a design nature and of vital or major importance.

The periodic tests are generally brought together and designated group C tests. Tests in this group comprise both destructive and non-destructive test procedures that are applied periodically to confirm that certain characteristics, in addition to those already included in groups A and B, are being maintained. These characteristics may be related either to design or to the fabrication process and can be of vital, major and minor importance to the function of the relay.

If appropriate, a group D may be included containing additional tests required for the maintenance of qualification approval.

7.4.1.3 Division into subgroups

Groups can be further subdivided into subgroups (see Annex D). Division is made according to the relative importance (vital, major, minor) of the feature to the overall function of the relay and the frequency of testing; thus the subgroup to which the test should be allocated is determined.

The sectional and/or blank detail specification shall show the order in which the tests or conditions in the subgroup shall be carried out where this order may affect the test results. The blank detail specification shall also indicate wherever any particular order of testing in any subgroup is to be observed. Where a subgroup contains a destructive test, this shall either be stated in full or the symbol "D" shall be placed alongside the title of the subgroup in the schedule of inspection requirements in the blank detail specification.

7.4.2 Resubmission of rejected lots

No requirements at present.

7.4.3 Delivery of relays subjected to destructive tests or non-destructive tests

Relays subjected to destructive tests shall not be included in the lot for delivery. Relays subjected to non-destructive tests may be delivered provided they are re-tested to group A requirements and satisfy them.

7.4.4 Delayed delivery

Relays which have been held by the manufacturer for a period exceeding 12 months following acceptance inspection, shall be re-inspected as prescribed in the detail specification, unless a different period is specified therein.

If this has been done for the complete lot, no further retesting before delivery is needed for another period of one year or as otherwise specified in the detail specification.

7.4.5 Supplementary procedure for deliveries

When this has been nationally recognized, manufacturers may, at their discretion, supply relays that have met a higher assessment level against orders for a lower assessment level.