BS EN 61811-1:2015

BSI Standards Publication

Electromechanical telecom elementary relays of assessed quality

Part 1: Generic specification and blank detail specification

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National foreword

This British Standard is the UK implementation of EN 61811-1:2015. It is identical to IEC 61811-1:2015. It supersedes BS EN 61811-1:1999, BS EN 61811-50:2002, BS EN 61811-51:2002, BS EN 61811-52:2002, BS EN 61811-53:2002, BS EN 61811-54:2002, BS EN 61811-55:2002, BS EN 61811-10:2003 and BS EN 61811-11:2003, which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/94, General purpose relays and reed contact units.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Electromechanical telecom elementary relays of assessed quality - Part 1: Generic specification and blank detail specification (IEC 61811-1:2015)

Relais télécom électromécaniques élémentaires soumis au régime d'assurance qualité - Partie 1: Spécification générique et spécification particulière cadre (IEC 61811-1:2015)

Elektromechanische Telekom-Elementarrelais mit bewerteter Qualität - Teil 1: Fachgrundspezifikation und Bauartspezifikation (IEC 61811-1:2015)

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

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Foreword

The text of document 94/379/FDIS, future edition 2 of IEC 61811-1, prepared by IEC/TC 94 "All-ornothing electrical relays" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61811-1:2015.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-12-04
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-03-04

This document supersedes EN 61811-1:1999, EN 61811-10:2003, EN 61811-11:2003, EN 61811-50:2002, EN 61811-51:2002, EN 61811-52:2002, EN 61811-53:2002, EN 61811-54:2002 and EN 61811-55:2002.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61811-1:2015 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 standards indicated:

IEC 60068-2-47:2005	NOTE	Harmonized as EN 60068-2-47:2005 (not modified).
IEC 61649	NOTE	Harmonized as EN 61649.
IEC 61709:2011	NOTE	Harmonized as EN 61709:2011 (not modified).
ISO 9001:2008	NOTE	Harmonized as EN ISO 9001:2008 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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

Publication	Year	Title	EN/HD	Year
IEC 60062	2004	Marking codes for resistors and capacitors	EN 60062 + corr. January	2005 2007
IEC 60068-1	2013	Environmental testing - Part 1: General and guidance	EN 60068-1	2014
IEC 60068-2-17	1994	Basic environmental testing procedures - Part 2: Tests - Test Q: Sealing	EN 60068-2-17	1994
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	EN 60068-2-20	2008
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)	EN 60068-2-58 + corr. December	2004 2004
IEC 60410	1973	Sampling plans and procedures for inspection by attributes	-	-
IEC 60695-11-5	2004	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2005
IEC 61810	Series	Electromechanical elementary relays	EN 61810	Series
IEC 61810-1	2008 [1)]	Electromechanical elementary relays - Part 1: General requirements	EN 61810-1	2008
IEC 61810-2	2011	Electromechanical elementary relays - Part 2: Reliability	EN 61810-2	2011
IEC 61810-7	2006	Electromechanical elementary relays - Part 7: Test and measurement procedures	EN 61810-7	2006
ISO 2859	Series	Sampling procedures for inspection by attributes	-	

[1)] Superseded by IEC 61810-1:2015.

CONTENTS

ELECTROMECHANICAL TELECOM ELEMENTARY RELAYS OF ASSESSED QUALITY –

Part 1: Generic specification and blank detail specification

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

3.6 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

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

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

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

d) 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.

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

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

b) Preferred duration: 1 s or 60 s

4.5 Impulse voltage test

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

b) Preferred waveform: 0,5 μs/700 μs, 1,2 μs/50 μs or 10 μs/700 μs.

c) Preferred number of pulses (alternate positive and negative pulses): 10.

d) Preferred frequency of pulses: 2 pulses/min or 4 pulses/min.

4.6 Insulation resistance

Preferred value: 1 000 MΩ 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.

7.4.6 Unchecked parameters

When supplementary information is given in detail specifications, this shall not be the subject of inspection.

7.4.7 Release for delivery before completion of group B tests

When the conditions of IEC 60410 for reduced inspection have been satisfied for all group B tests, the manufacturer is permitted to release the relays before the completion of such tests.

7.4.8 Screening procedures

When screening is specified in the detail specification or the purchase order, it is to be applied to all devices in the production lot prior to the formation of samples for quality conformance testing (lot-by-lot and periodic).

The test shall be performed in the given order. When, however, part of the screening sequence is already performed during production and in the same sequence, it need not be repeated.

Any device found defective during any of the tests shall be removed and not considered as part of the production lot for subsequent sampling purposes.

When the number of defectives at the end of the screening exceeds 10 % of the size of the production lot, this lot shall be rejected for the intended application of the appropriate test schedule. If not contradictory, the lot may be used for a lower specified application.

7.4.9 Formation of inspection lots

Inspection lots submitted to groups A and B acceptance tests shall be formed in accordance with 8.5 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.

7.4.10 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.

7.5 Periodic inspection / Intervals between tests

– Subgroups A4, B1 and B2: minimum once a week.
– Subgroups C1 and C2: at least once a year.
– Subgroups C4 to C6: at least once every two years.

8 Test schedule

8.1 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.

8.2 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 5.9 of IEC 61810-1:2008.

8.3 Categories of application of contacts

CC 0 30 mV max./10 mA max.

CC 1 A load without arcing (no arc duration longer than 1 ms)

CC 2 A high load where contact arcing can occur.

The definitions of contact application are defined in Annex C of IEC 61810-1:2008.

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 8.5).

8.4 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.

8.5 Test groups and subgroups

For the 100 % test subgroup, a relay shall be rejected when it fails any test. For detection purposes, a contact can be considered closed when the voltage drop across it is less than one half of its open-circuit value. Conditions of test shall be specified in the detail specification. All contact loads shall be at a level that does not cause significant change to the contact surfaces.

Electrical endurance testing shall be for a minimum number of operations as defined in the blank detail or detail specification. If required, these tests can be continued to failure in order to acquire reliability data. Failure criteria and rules shall be specified in the blank detail specification.

For electromechanical telecom elementary relays, the majority contact action is break-before-make change-over. To ensure that the contact sequencing occurs in this order, the transfer time measurement refers to the time interval during which all contact circuits of a relay are open.

Analogously, to ensure that the make-before-break change-over contact sequencing occurs in the right order, the bridging time measurement refers to the time interval during which all contact circuits of a relay are closed.

Specifying of time to stable closing in the detail specification is optional.

Abbreviations:

M: mandatory test to be included in the blank detail or detail specification;

R: recommended test to be included in the blank detail or detail specification;

(D): destructive test;

(ND): non-destructive test.

Details are given in the following Table 1 to Table 3.

Table 1 – Group A

Subgroup A0

For all tests in this subgroup: 100 % test. The lot shall be rejected in case of failure rate of more than % cumulative. All tests carried out at ambient 23 °C.

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Visual inspection – relay marking (ND) 4.6.2 a) and 4.6.2 b)	R	
Coil resistance (ND) 4.8.1	M	
Dielectric test (ND) 4.9	M	
Contact-circuit resistance, static (ND) 4.12	M	Test voltage and current as for CC 0
Functional tests (ND) 4.13	M	Checking the relay function by monitoring the contacts
Timing tests (ND) 4.14.2	M	
Sealing (ND) 4.20.2	R	Procedure 1 (test Qc, method 2), procedure 2 (test Qk, method 1 or 2) or procedure 4 (test Qy) for RT III and RT IV
Acoustic noise (ND) 4.44	R	If stated in the detail specification only

Subgroup A4

For all tests in this subgroup IL: S-4
AQL: 0,25…1,0…4

Lot-by-lot

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Visual inspection – relay marking (ND) 4.6.2, items a) and b)	M	
Coil resistance (ND) 4.8.1	M	
Contact-circuit resistance, static (ND) 4.12	M	Test voltage and current as for CC 0
Functional tests (ND) 4.13	M	Checking the relay function by monitoring the contacts
Timing tests (ND) 4.14.2	M	
Sealing (ND) 4.20.2	M	Procedure 1 (test Qc, method 2), procedure 2 (test Qk, method 1 or 2) or procedure 4 (test Qy) for RT III and RT IV
Acoustic noise (ND) 4.44	R	If stated in detail specification only

Table 2 – Group B

Subgroup B1

For all tests in this subgroup IL: S-3
AQL: 0,4…1,0…4

Lot-by-lot

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Visual inspection – check of dimensions of stick magazines (ND) 4.6.1 and 4.6.2 a)	M	If applicable
Visual inspection – other than marking, check of relay outside key dimensions (ND) 4.6.1 and 4.6.2 c) and 4.6.2 d)	M	

Subgroup B2

For all tests in this subgroup IL: S-3
AQL: 0,4…1,0…4

Lot-by-lot

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Solderability (D) 4.25	M	If not tested in sub-group C1

Table 3 – Group C *(1 of 2)*

Subgroup C1

For all tests in this subgroup fixed sample size.

Period shall not exceed 1 year.

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Magnetic interference (ND) 4.37	R	If stated in the detail specification only
Solderability (D) 4.25	M	For relays manufactured with automatic facilities only, if not tested in subgroup B2
Electrical endurance (D) 4.30	M contact	Severity level A , definition of contact fault and failure in accordance with 3.3 of this specification

Subgroup C2

For all tests in this subgroup fixed sample size.

Period shall not exceed 1 year.

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Acoustic noise (ND) 4.44	R	Method 1, only if not tested in A0 or A4 respectively
Dielectric test (ND) 4.9	M	
Impulse voltage test (ND) 4.10	M	
Insulation resistance (ND) 4.11	M	
Sealing (ND) 4.20.2	R	Procedure 1 (test Qc, method 2), procedure 2 (test Qk, method 1 or 2) or procedure 4 (test Qy) for RT III and RT IV

Subgroup C4

For all tests in this subgroup fixed sample size in accordance with A.4 of IEC 61810-2:2011.

Period shall not exceed 2 years.

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Electrical endurance, extended assessment (D) 4.30	M	Severity level A; prolongation of test from subgroup C1 possible, definition of contact fault and contact failure in accordance with 3.3 of this specification

Table 3 – Group C *(2 of 2)*

Subgroup C5

For all tests in this subgroup fixed sample size.

Period shall not exceed 2 years.

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Climatic sequence (D) 4.15	M	Dry heat, 4.15.2 Damp heat cyclic, 4.15.3 Cold, 4.15.4 Damp heat cyclic, 4.15.6
Damp heat, steady state (D) 4.16	M	
Robustness of terminals (D) 4.24	M	
Shock (D) 4.26	M	Method 1, functional Method 2, survival
Vibration (D) 4.28	M	Method 1, functional
Mechanical endurance (D) 4.31	M	Method 2
Thermal endurance (D) 4.32	M	
Overload (contact circuit) (D) 4.34	M	
Magnetic interference (ND) 4.37	R	Only if not tested in C1
Resistance to cleaning solvents (D) 4.47.2	M	
Fire hazard (D) 4.48.2	M	Procedure according to IEC 60695-11-5:2004

Subgroup C6

For all tests in this subgroup fixed sample size.

Period shall not exceed 2 years.

Test from IEC 61810-7:2006 Subclause	Options and particular requirements	
Weighing (ND) 4.7.2	M	
Thermal resistance (ND) 4.17	M	
Rapid change of temperature (D) 4.19	M	Method 1
Resistance to soldering heat (D) 4.25.2	M	Method 2 for THR Methode 4 for SMD

9 Tests

9.1 Standard conditions for testing

If not otherwise stated, all tests shall be performed under standard conditions for testing according to 4.5 of IEC 61810-7:2006.

9.2 Mounting of test specimens during the test

The following indications shall apply for mechanical-dynamic tests (shock and vibration): the relay shall be mounted by its normal mounting method to the test fixture where inherent resonances have been minimized so as not to invalidate the test (see also IEC 60068-2-47).

9.3 General conditions for testing

Unless otherwise stated, the rated coil voltage specified in Table B.3 and its suitable polarity (if applicable) shall be used for all tests and its application to the relay.

10 Ordering information

The manufacturer shall provide a complete and unambiguous coding for all relays covered by the detail specification, containing all relevant characteristics as e.g. rated coil voltage, contact configuration, mounting type or any special attributes as applicable.

The coding of the monostable or bistable relay type shall be combined with the rated power of the coil, if applicable.

The reference to the number and types of contacts shall be given on the front page of the specification.

A conversion list with the manufacturer's part numbers may be given in an annex to the detail specification.

Annex A
(informative)

Relay reliability – Failure rate data

A.1 General

The evaluation and indication of reliability data is not mandatory.

However, if required in a detail specification (see Annex C), the failure rate data for the reliability prediction of telecom relays in electronic equipment (telecommunication systems, data processing, etc.) shall be stated in an appropriate way. It is strongly recommended to give such data in accordance with IEC 61709. Therefore, the preferred (blank) data base for failure rates, the stress model and the particular stress factors for conversion of the failure rate data at reference conditions to the actual operating conditions are given in this informative annex. In the relevant detail specification, reference shall be made to this annex and further details shall be given.

The reference failure rate shall be determined by the manufacturer for his particular relay type. The relay manufacturer is required to log cumulatively all endurance test data and all other relevant data including those derived from field experience, which would demonstrate/ indicate achieved reliability. The endurance tests specified in the detail specification are intended, amongst other things, to provide a measure of the failure rate under prescribed conditions.

If another stress model, or other stress factors respectively, are known to be more suitable for a particular relay type, such deviations shall be clearly described in an annex of the relevant detail specification and used instead (all necessary details which allow the conversion of the failure rate data to the actual operating conditions and the source(s) of these data shall be described).

Relay manufacturers are not required to demonstrate the achievement of the failure rate data before delivery of a specific lot.

A.2 Scope

This annex details the data base for failure rates of telecom relays based on IEC 61810-2 and IEC 61649. If required in the relevant detail specification, the information given below and any further details necessary should be given in a respective annex in that specification.

A.3 Description of the relay

A.3.1 Identification

The XY relay in accordance to the detail specification. For further details, see boxes (5) and (6) of the relevant detail specification (see Annex C).

A.3.2 Ratings

Coil data and contact data see boxes (9), (10) and (11) of the relevant detail specification (see Annex C).

A.4 Fault and failure data

A.4.1 Fault and failure definition

According to 3.4 of this specification – see also IEC 61810-2.

A.4.2 Fault application

Useful life time period. Beginning of useful life time: relay in new condition; end of useful life time: number of switching cycles stated in Table B.4 of the relevant blank detail specification.

A.4.3 Failure definition

Contact failure: contact-circuit resistance of a closed contact higher than 1 Ω, or resistance of an open contact circuit lower than 100 kΩ, both more than once per 10^5 cycles (or for the minimum number of switching cycles stated), calculated for each single contact; or a contact fault due to non-opening with a short circuit between break and make contact (resistance value lower than 100 Ω). This means that one contact fault is permissible for 100 000 switching cycles and seven contact faults are permissible for 700 000 switching cycles.

A.4.4 Failure application

Wear-out failure time period.

A.5 Source of data

Manufacturer's laboratory tests in accordance with IEC 61810-2.

A.6 Weibull approach

The Weibull analysis in accordance to IEC 61810-2 shall be used, if there are no historical data are available. Otherwise, the WeiBayes approach in accordance to IEC 61649 could be used.

The main data out of Weibull are:

a) Mean cycles to failure (MCTF)

The point 63,2 % estimate of the mean cycles to failure is m.

b) Value of $\hat{B}_{10}$

The point estimate of B_{10}, in number of cycles by which 10 % of the population will have failed.

c) Mean time to failure (MTTF)

Only where an estimate of the number of cycles per unit of time appropriate to a specific end use is known, then a mean time to failure (MTTF) for the relay can be determined.

EXAMPLE If the number of cycles per unit of time is equal to 100 cycles per day and the relay MCTF value is $3\ 185 \times 10^3$, the MTTF for the relay in this application can be calculated as follows:

MTTF = MCTF / Number of cycles per unit of time = $3\ 185 \times 10^3$ / 100 = 31 850 days.

A.7 WeiBayes approach

A.7.1 Description

In WeiBayes analysis, the shape parameter, β, is assumed from historical failure data, prior experience, or from engineering knowledge of the physics of the failure. WeiBayes is defined as Weibull analysis with a given β parameter. It is a single parameter (η) Weibull distribution. WeiBayes can be used to analyse data sets with and without failures, where both types of data may have suspensions.

A.7.2 Method

Given β, Equation (A.1) may be derived using the method of maximum likelihood to determine the characteristic life, η:

$$\eta = \left[\sum_{i=1}^{N} \frac{t_i^{\beta}}{r} \right]^{1/\beta} \quad \text{(A.1)}$$

where

t is the time or cycles;

r is the number of failed items;

N is the total number of failures plus suspensions;

η is the maximum likelihood estimate of the characteristic life.

With β assumed and η calculated from Equation (A.1), a Weibull distribution is defined. A WeiBayes line is plotted on Weibull probability paper. The WeiBayes plot is used exactly like any other Weibull plot. Estimates of B lives, failure forecasts, and reliability are available from WeiBayes analysis.

A.7.3 WeiBayes without failures

In many WeiBayes problems, no failure has occurred. For example, a redesigned component may have been tested without any observed failures. In this case, a second assumption is required. The first failure is assumed to be imminent, i.e. in the equation, set r = 1,0. As no failures have occurred, this is a conservative engineering assumption. The resulting WeiBayes line is similarly conservative. Statistically, the WeiBayes line, based on assuming one failure, is a lower one-sided confidence estimate. That is, it may be stated with 63,2 % confidence that the true Weibull distribution lies to the right of the WeiBayes line, if the assumption of β is correct.

WeiBayes lines may be obtained at any level of confidence by employing larger or smaller denominators (assume imminent failures):

Confidence	50 %	63,2 %	90 %	95 %	99 %
Denominator	0,693	1,0	2,3	3,0	4,6

A.7.4 WeiBayes with failures

When the denominator is based on actual failures, the scale parameter, η, is an MLE estimate. A valuable characteristic of MLE estimates is that they are invariant under transformation. This means that the resulting WeiBayes line, B lives, and reliability estimates are all MLE estimates. The WeiBayes line is an MLE estimate of the true unknown Weibull distribution, a nominal Weibull.

Weibull distributions based on samples of 2 or 3 failures have large uncertainties. If there is good knowledge of β from prior data, significant improvements in accuracy may be obtained with WeiBayes. WeiBayes may offer cost reductions through reduced testing without loss of accuracy. A Weibull distribution library or data bank to provide Weibull distribution slope histories is strongly recommended in order to obtain the advantage of WeiBayes analysis.

The distinction between zero failure and one failure WeiBayes is worth reviewing. For example, assume five redesigned units have been tested without failure. A WeiBayes line is calculated based on the β value estimated from the original design. This is a lower one-sided confidence interval for the true unknown Weibull for the redesign. Now assume the same data set includes one failure and four suspensions.

The resulting WeiBayes is identical to the first zero failure WeiBayes, but the interpretation is different. With one failure, the WeiBayes is a nominal, MLE estimate of the true unknown Weibull distribution, not a confidence interval. However, a lower confidence bound for the MLE WeiBayes line may be calculated using Chi-squared.

If r is the number failures (≥1), the lower C % confidence limit for η is given by the following equation:

$$\eta_{\mathrm{c}} = \eta_{MLE} \left(2\,\mathrm{r} / \chi_{C}^{\,2}\left(2\mathrm{r}+2\right)\right)^{(1/\beta)}$$

Using η_{c} and β, the lower confidence bound for the true WeiBayes line is defined.

A.7.5 WeiBayes case study

Fifteen relays failures have been experienced in a large fleet of aircraft engines. Weibull analysis provides a β of approximately 5,0. Three redesigned relays have been tested in engines to $1\,600 \times 10^3$ cycles, $2\,900 \times 10^3$ cycles and $3\,100 \times 10^3$ cycles without failure. Is this enough testing to substantiate that the redesign is significantly better than the old design? Assuming β = 5,0 and the times on the three redesigned units, the characteristic life may be estimated for a WeiBayes solution.

$$\eta = \left[\frac{(1\,600)^5 + (2\,900)^5 + (3\,100)^5}{1}\right]^{1/5} = 3\,468 \times 10^3 \text{ cycles}$$

The WeiBayes line is plotted in Figure A.1. It may be stated with 63 % confidence that the Weibull distribution for the redesigned units is to the right of this line and, therefore, significantly better than the parts in the bill-of-materials. It is possible that the redesign has eliminated this failure mode but that cannot be proven with this sample of data. As more time is put on these units without failure, the WeiBayes line will move further to the right and more assurance will be gained that the failure mode has been eliminated. The assumption of slope, in this case, is based on an established Weibull failure model.

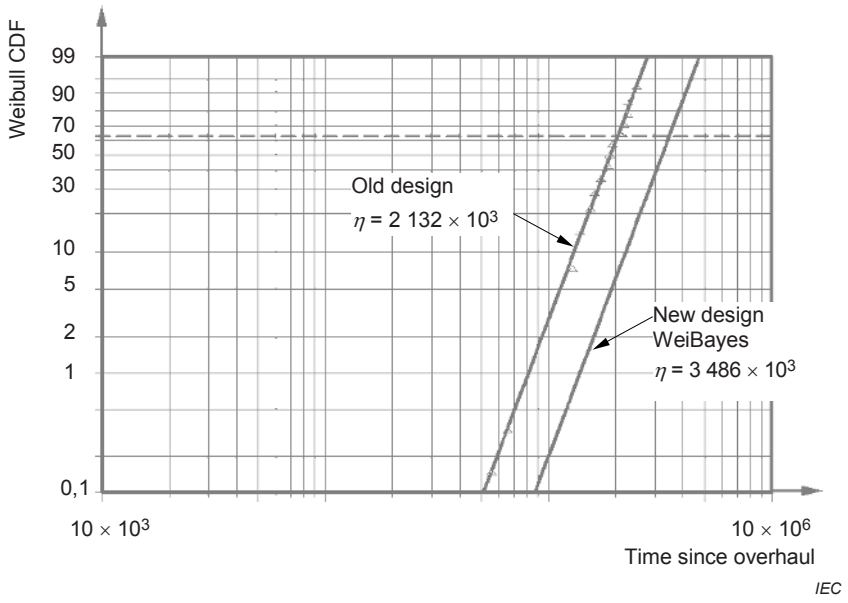


Figure A.1 – New compressor design WeiBayes versus old design

When testing highly reliable items, a very small number of failures is often observed, i.e. zero failures or just one failure. This does not permit estimation of the parameters of a two- or three-parameter Weibull distribution.

In cases where the β value for the relevant failure mode is known from previous tests, a rough estimate can still be made with zero or one failure. Furthermore, the estimation of the best straight line through a small number of points can be improved if the β value is known. The available information can then be used to estimate the η value.

Annex B
(informative)

Characteristic values of the relay

B.1 General data

– Thermal resistance: max. ... K/W
– Contact category: CC0, CC1, and CC2
– Relay mass: max. ... g
– Finish of the terminals: presoldering; admissible non-presoldered part: max. 1 mm to the stand-off plane, if applicable
– Insulation resistance: 1 000 MΩ min. at 500 V d.c. initial value 2 MΩ min. at 500 V d.c. after tests
– Dielectric strength: see Table B.1
– Dielectric strength: see Table B.2

Table B.1 – Dielectric test voltages

	Dielectric test V a.c. min.				
	Type 0	Type 1	Type 2	Type 3	Type 4
Opened contact circuits	500	750	500	750	750
Between adjacent contact circuits	500	750	750	750	750
Coil to contact circuits	1 000	1 000	1 000	1 000	1 500
Between separated windings (if applicable)					

Table B.2 – Impulse test voltages

	Impulse voltage test V min. – pulse shape				
	Type 0	Type 1	Type 2	Type 3	Type 4
Opened contact circuits	750 – 10/700 μs	1 000 – 10/700 μs	750 – 10/700 μs	1 000 – 10/700 μs	1 000 – 10/700 μs
Between adjacent contact circuits	750 – 10/700 μs	1 000 – 10/700 μs	1 000 – 10/700 μs	1 000 – 10/700 μs	1 500 – 10/700 μs
Coil to contact circuits	1 500 – 1,2/50 μs	1 500 – 1,2/50 μs	1 500 – 1,2/50 μs	2 000 – 1,2/50 μs	2 500 – 1,2/50 μs

B.2 Coil data

Table B.3 – Coil data

Identification code	Rated voltage [V]	Coil Resistance [Ω] ± 10 % at coil temperature of	Shall not operate voltage [V] at coil temperature of	Operate voltage [V] at coil temperature of			Limiting coil voltage U_2 [V] at	Shall not release voltage [V] at coil temperature of	Release voltage [V] at coil temperature of			Rated power [mW]
				-40 °C	23 °C	85 °C	85 °C	23 °C	-40 °C	23 °C	85 °C	

B.3 Contact data

B.3.1 Electrical endurance and switching frequency

Contact failure: contact-circuit resistance of a closed contact higher than the value stated in Table B.4, or resistance of an open contact circuit lower than 100 kΩ, both more than once per 10^5 cycles or for the minimum number of switching cycles stated, calculated for each single contact; or a contact fault due to non-opening with a short circuit between break and make contact (resistance value lower than 100 Ω), i.e. one contact fault is permissible for 100 000 switching cycles and seven contact faults are permissible for 700 000 switching cycles.

At a given endurance of 10^6 operations, the total number of faults, as described above, shall not exceed 10.

Table B.4 – Loads, contact-circuit resistance limits, switching cycles and frequencies for electrical endurance and overload tests

Loads*	Contact-circuit resistance [Ω] max.	Number of switching cycles min.	Switching frequencies cycles per s max.
Contact application CC0	1	1 000 000	12,5
Resistive – max. contact voltage/max. power	1	100 000	3
Resistive – max. contact current/max. power	1	100 000	3
DC open-ended cable	1	1 000 000	12,5
Particular application-related, if required			
Overload	1 *	100	0,3
* Unless otherwise stated in the detail specification.			

B.3.2 Static contact-circuit resistance

100 mΩ max. initial value at rated voltage;

1 Ω max. during/after electrical endurance, mechanical endurance and environmental tests at rated voltage.

B.3.3 Mechanical endurance

10^7 min. switching cycles.

B.3.4 Timing (without suppression device)

– Operate time:	max. 5 ms
– Release time:	max. 5 ms
– Bounce time when the contacts are closing:	max. 5 ms
– Bounce time when the contacts are opening:	max. 3 ms
– Transfer time on operation and release (last break contact opens before first make contact closes respectively last make contact opens before first break contact closes – each contact monitored):	min. 0,05 ms

B.4 Mounting

The relay terminals are designed to be directly soldered onto the printed circuit board using conventional assembling techniques or for surface mounting technology (as applicable).

B.5 Environmental data

The relays shall withstand at least the following environmental stresses:

– shock, functional: 98,1 m/s^2 (10 g) half-sine acceleration, 11 ms duration;
– shock, survival: 981 m/s^2 (100 g) half-sine acceleration, 0,5 ms duration;
– vibration (sinusoidal): amplitude 0,75 mm or 98,1 m/s^2 (10 g), 10 Hz to 500 Hz;
– mechanical robustness of terminals
  - thrust: 1 N;
  - bending: 2 bends;
– soldering
  - if particular ageing is required, this shall be selected from ageing procedure 1a, 1b, 2 or 3 of 4.1.1 of IEC 60068-2-20:2008 and stated in the detail specification;
– through hole type:
  - solder ability at 250 °C: 2 s;
  - resistance to soldering heat, terminal immersion time at 260 °C: 5 s;
– surface mounting type:
  - 6.2 of IEC 60068-2-58:2004 (i.e. 260 °C/5 s and 215 °C/40 s);
  - group 3, 7. 2 and 8 of IEC 60068-2-58:2004 (i.e. vapour phase soldering or infrared soldering, if the temperature stress is adequate);
– enclosure leakage rate: max. 100 Pa·cm^3/s;
  - resistance to cleaning solvents when rubbed with tissue paper
  - demineralized or distilled water at 55 °C: 5 min;
– fire hazard, needle flame: min. 10 s.

B.6 Package of relays for automatic handling (if applicable)

If stick magazines or tape and reel packaging for automatic handling (to facilitate automatic relay insertion) are used, their outline drawing (profile and length), storage capacity and possible marking shall be given in an annex.

Annex C
(informative)

Blank detail and detail specification

C.1 Examples for front pages

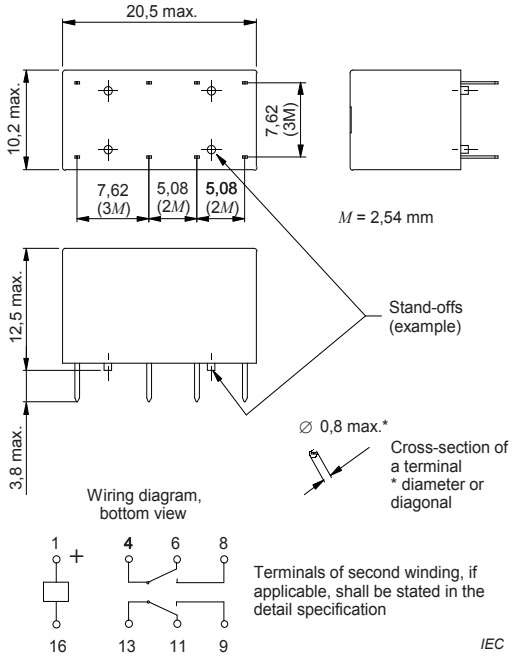
C.1.1 General

The layout of the front pages of the detail specification is as in the examples C.1.2 to C.1.6. The key is given in C.1.7.

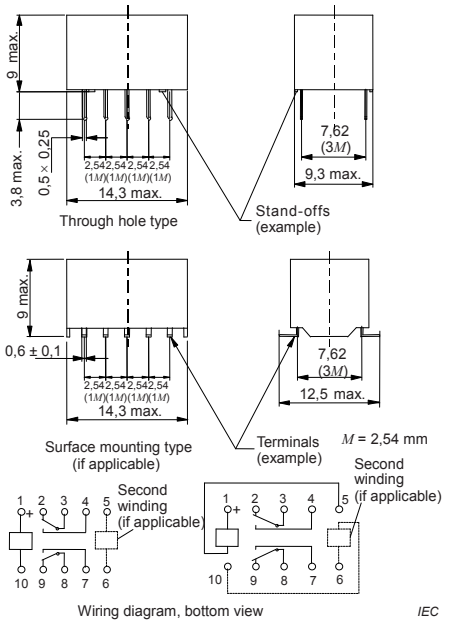
C.1.2 Type 0 – Non-standardized types and construction

	(1)	xxxxxx Edition: 200X Page 1 of x	(2)
Electromechanical components in accordance with: IEC 61810-1 IEC 61810-2 IEC 61810-7 IEC 61811-1	(3)		(4)
Detail specification for electromechanical telecom elementary relays of assessed quality Type: Construction:			(5) (6)
Outline drawing and wiring diagram Dimensions in millimetres	(7)	Application:	(8)
Coil data Rated voltages: … V d.c. Rated power: … mW			(9)
Contact data Number(s) and type(s) of contacts Rated contact voltage: Rated contact current: Rated contact power:			(10)
Component climatic category according to IEC 60068-1: Temperature range – operating ambient temperature: …°C to …°C – storage temperature: …°C to …°C			(11)

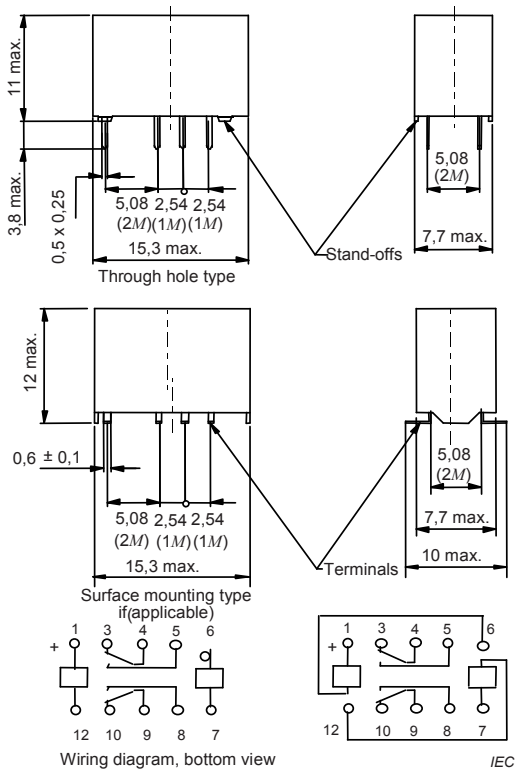
C.1.3 Type 1 – Two change-over contacts, 20 mm × 10 mm base

(1)	xxxxxx Edition: 200X Page 1 of x (2)
Electromechanical components in accordance with: (3) IEC 61810-1 IEC 61810-2 IEC 61810-7 IEC 61811-1	(4)
Detail specification for electromechanical telecom elementary relays of assessed quality, dual-in-line, with 20 mm × 10 mm base, two change-over contacts Type: contact configuration, e.g. two change-over contacts (5) Construction: dual-in-line, with 20 mm × 10 mm base plastic sealed case, overall height of 12,5 mm max. relay properties RT III for conventional assembling techniques of printed circuit boards using mounting holes and soldering (6)	
Outline drawing and wiring diagram (7) Dimensions in millimetres  	Application: (8) Relays according to this standard are provided for the operation in telecommunication applications. However, as printed circuit board relays, they are suitable also for particular industrial and other applications. NOTE Drawings are examples; the maximum outer dimensions, the wiring diagrams of one coil relay, the terminal arrangement and the same orientation of all rectangular terminals are mandatory.
Coil data (9) Rated voltages: ..... V d.c. Rated power: ..... mW	
Contact data (10) Change-over break-before-make contacts Rated contact voltage: 110 V d.c. / 125 V a.c. Rated contact current: 1,25 A max Rated contact power: 30 W/50 VA	
Component climatic category according to IEC 60068-1: 25/70/21 (11) Temperature range – operating ambient temperature: –25 °C to 70 °C – storage temperature: –40 °C to 85 °C	

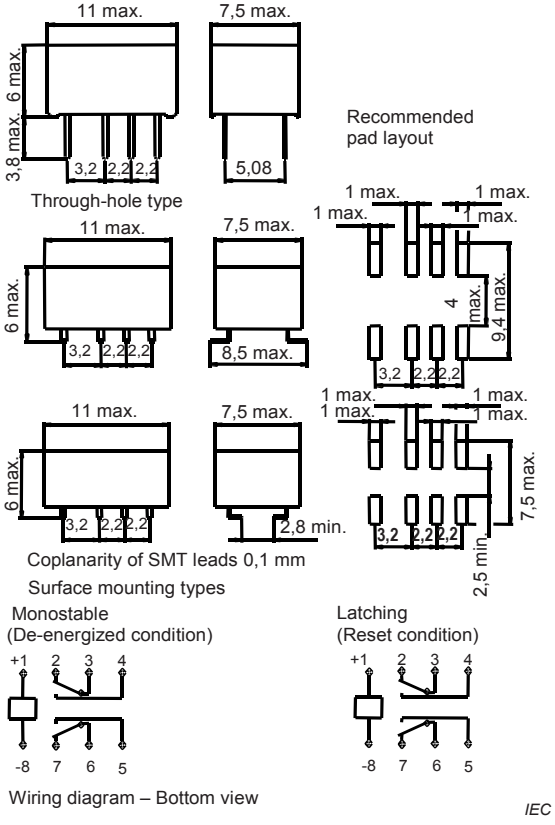
C.1.4 Type 2 – Two change-over contacts, 14 mm × 9 mm base

(1)	xxxxxx (2) Edition: 200X Page 1 of x
Electromechanical components in accordance with: (3) IEC 61810-1 IEC 61810-2 IEC 61810-7 IEC 61811-1	(4)
Detail specification for electromechanical telecom elementary relays of assessed quality, dual-in-line, with 14 mm × 9 mm base, two change-over contacts Type: contact configuration, e.g. two change-over contacts (5) Construction: dual-in-line, with 14 mm × 9 mm base (6) plastic sealed case, overall height of 9 mm max. relay properties RT III for conventional assembling techniques of printed circuit boards using mounting holes and soldering or for surface mounting technology (if applicable)	
Outline drawing or wiring diagram (7) Dimensions in millimetres  Drawings are examples; the maximum outer dimensions, the wiring diagram of one coil relay, the terminal arrangement and the same orientation of all rectangular terminals are mandatory.	Application: (8) Relays according to this standard are provided for the operation in telecommunication applications. However, as printed circuit board relays, they are suitable also for control or switching functions in particular industrial and other applications.
Coil data (9) Rated voltages: .....V d.c. Rated power: .....mW	
Contact data (10) Change-over break-before-make contacts Rated contact voltage: 110 V d.c. / 125 V a.c.* Rated contact current: 1,25 A max. Rated contact power: 30 W/50 VA* Limiting continuous current: 2 A max. * AC values mandatory only if stated in the detail specification.	
Component climatic category according to IEC 60068-1: 25/70/21 (11) Temperature range – operating ambient temperature: –25 °C to 70 °C – storage temperature: –40 °C to 85 °C	

C.1.5 Type 3 – Two change-over contacts, 15 mm × 7,5 mm base

(1)	xxxxxx Edition: 200X Page 1 of x (2)
Electromechanical components in accordance with: (3) IEC 61810-1 IEC 61810-2 IEC 61810-7 IEC 61811-1	(4)
Detail specification for electromechanical telecom elementary relays of assessed quality, dual-in-line, with 15 mm × 7,5 mm base, two change-over contacts Type: contact configuration, e.g. two change-over contacts (5) Construction: dual-in-line, with 15 mm × 7,5 mm base plastic sealed case, overall height through-hole type of 11 mm max. surface mounting type of 12 mm max. relay properties RT III for conventional assembling techniques of printed circuit boards using mounting holes and soldering or for surface mounting technology (if applicable) (6)	
Outline drawing and wiring diagram Dimensions in millimetres (7)  Drawings are examples; the maximum outerdimensions, the wiring diagram of one coil relay, the terminal arrangement and the same orientation of all rectangular terminals are mandatory.	Application: (8) Relays according to this standard are provided for the operation in telecommunication applications. However, as printed circuit board relays, they are suitable also for control or switching functions in particular industrial and other applications.
Coil data (9) Rated voltages: V d.c. Rated power: mW	
Contact data (10) Change-over break-before-make contacts Rated contact voltage: 110 V d.c. / 125 V a.c.* Rated contact current: 1,25 A max. Rated contact power: 30 W/50 VA* Limiting continuous current: 2 A max. * AC values mandatory only if stated in detail specification.	
Component climatic category according to IEC 60068-1: 25/70/21 (11) Temperature range – operating ambient temperature: –25 °C to 70 °C – storage temperature: –40 °C to 85 °C	

C.1.6 Type 4 – Two change-over contacts, 11 mm × 7,5 mm (max.) base

(1)	xxxxxx (2) Edition: 200X Page 1 of x
Electromechanical components (3) in accordance with: IEC 61810-1 IEC 61810-2 IEC 61810-7 IEC 61811-1	(4)
Detail specification for electromechanical telecom elementary relays of assessed quality, two change-over contacts, with 11 mm × 7,5 mm (max.) base Type: contact configuration, e.g. two change-over contacts (5) Construction: dual-in-line, with 11 mm × 7,5 mm (max.) base, overall height of 6 mm max. (6) plastic sealed case for assembling techniques of printed circuit boards using mounting holes and soldering or for surface mounting technology (as applicable)	
Dimensions in mm (7)  Drawings are examples; the maximum outer dimensions, the wiring diagram of coil relay, the terminal arrangement and the same orientation of all rectangular terminals are mandatory.	Application: (8) Relays according to this standard are provided for the operation in telecommunication applications. However, as printed circuit board relays, they are suitable also for control or switching functions in particular industrial and other applications.
Coil data (9) Rated voltages: 1,5 … 12 V d.c. Rated power: 140 / 100 mW	
Contact data (10) Change-over break-before-make contacts Rated contact voltage: 120 V d.c. / 125 V a.c. Rated contact current: 1 A max Rated contact power: 30 W / 30 VA Limiting continuous current: 1 A max	
Component climatic category according to IEC 60068-1: 25/70/21 (11) Temperature range – operating ambient temperature: –25 °C to +70 °C – storage temperature: –40 °C to +85 °C	

C.1.7 Key to front page

The numbers between brackets of the front page correspond to the following indications which should be given.

Identification of the detail specification

(1) The manufacturer name or Trademark or, if applicable, the organization from which the detail specification is available.

(2) Identification number of the detail specification.

(3) The number and the year of availability of the IEC standard concerning test and measurement procedures for electromechanical elementary relays and/or sectional specification; also national reference, if different.

(4) Any further information, if required, together with any amendment numbers.

Identification of the relay

(5) Type: monostable or bistable, non-polarized or polarized, two change-over contacts.

(6) Construction: sizes, for example dual-in-line, base and overall height, type of relay, based upon environmental protection according to 8.2, mounting variants and other typical construction details.

(7) An outline drawing with main dimensions, which are of importance for interchangeability, and/or reference to the appropriate national or international document for outlines. Alternatively, this drawing may be given in an annex to the detail specification, but (7) should always contain an illustration of the general outer appearance of the component.

Location and dimensions of stand-offs (maximum relay height shall include stand-offs), position of terminal No. 1 relative to the outside shape, acceptable offset of the tip of a terminal relative to the nominal grid position, indication of the area on the top of the relay housing to enable automatic mounting using aspirators, suitable hole diameter for assembling on printed circuit board.

(8) Typical field of applications.

(9) Available rated coil voltages and rated power.

(10) Available contact arrangements, defined special contact materials and contact voltage, current and power. The respective code digit for contact materials shall be listed in an annex, if applicable.

(11) Component climatic category according to Clause 8 and annex A of IEC 60068-1:1988, and temperature range.

C.2 Qualification approval procedures

– Sampling and test schedule are specified in Table C.2.

– The tests specified and their order are mandatory.

– Tests stated in Table C.3 are mandatory only if stated in the detail specification.

C.3 Quality conformance inspection

Quality conformance inspection contains the tests stated in Table C.1:

– groups A and B: lot-by-lot tests;

– group C: periodic tests.

Unless otherwise stated in this blank detail specification, all tests of Table C.1 are mandatory. Where a subgroup contains cumulative tests, the order of the tests is mandatory. Specimens subjected to tests denoted as destructive (D) shall not be released for delivery.

NOTE If a special level of AQL is required, the AQL value regarding subgroups A4, B1 and B2 in Table C.1 could be provided between the manufacturer and user of a relay.

C.4 Formation of inspection lots

The basis for determination of sample size for the quality conformance inspection is the relay quantity produced during one week.

Table C.1 – Quality conformance inspection *(1 of 14)*

Group A
Subgroup A0

For all tests in this subgroup: 100 % test. Discard all failed relays. Tests in this subgroup shall be carried out as a screening or sorting function, possibly on-line, prior to the formation of lots from which samples for the other subgroups are taken. The lot shall be rejected in case of a failure rate of more than 10 % cumulative.

Test No.	Test	Test conditions according to IEC 61810-7:2006	Performance requirements
A0 – 1	Coil resistance (ND)	4.8.1	Values according to Table B.2
A0 – 2	Dielectric test (ND)	4.9 Application points and test voltage: according to Table B.1 of this specification Duration of test: 1 s	No breakdown or flashover Maximum leakage current: 1 mA
A0 – 3	Contact-circuit resistance, static (ND)	4.12 Application points: terminals of all closed contacts Test voltage max.: 30 mV d.c. or a.c. Test current max.: 10 mA	Initial value according to B.3.2 for each contact closing
A0 – 4	Functional tests (ND)	4.13 Order of steps for monostable non-polarized relays: 1) 1,5 × rated voltage for conditioning 2) zero voltage 3) shall operate voltage 4) rated voltage 5) shall not release voltage 6) shall release voltage Order of steps for other relay types: analogous according to Figures 2 to 5 One cycle Contact voltage: max. 6 V Mounting: optional	Values according to Table B.3 Checking the relay function by monitoring the contacts
A0 – 5	Timing tests (ND)	4.14 Coil voltage: rated voltage Application points: all contacts Contact voltage: max. 6 V Mounting: optional	Values according to B.3.4 Checking of contact sequencing by measuring the transfer time (see 8.5)
A0 – 6	Sealing (ND)	4.20.2 Procedure 1, 2 or 4 for RT III and RT IV	Value according to B.5

Table C.1 *(2 of 14)*

Subgroup A4 (period: inspection lot refers to the production volume of not more than one week)

Test No.	Test	Test conditions according to IEC 61810-7:2006	IL	AQL	Performance requirements
1	Visual inspection – relay marking (ND)	4.6.2, items a) and b)	S-4	1,0	Marking as specified in Clause 5
2	Coil resistance (ND)	4.8.1			Values according to Table B.3
3	Contact-circuit resistance, static (ND)	4.12 Application points: terminals of all closed contacts Test voltage max.: 30 mV d.c. or a.c. Test current max.: 10 mA			Initial value according to B.3.2 for each contact closing
4	Functional tests (ND)	4.13 Order of steps: 1) 1,5 × rated voltage for conditioning 2) zero voltage 3) shall operate voltage 4) rated voltage 5) shall not release voltage 6) shall release voltage One cycle Contact voltage: max. 6 V Mounting: optional			Values according to Table B.3 Checking the relay function by monitoring the contacts
5	Timing tests (ND)	4.14 Coil voltage: rated voltage Application points: all contacts Contact voltage: max. 6 V Mounting: optional			Values according to B.3.4 Checking of contact sequencing by measuring the transfer time
6	Sealing (ND)	4.20.2 Procedure 1, 2 or 4 for RT III and RT IV			Value according to B.6

Table C.1 *(3 of 14)*

Group B
Subgroup B1 (period: inspection lot refers to the production volume of not more than one week)

Test No.	Test	Test conditions according to IEC 61810-7:2006	IL	AQL	Performance requirements
7	Visual inspection – check of dimensions of stick magazines (ND) *	4.6.2 , items a) and b)	S-3	2,5	According to Table C.2, Group 0
8	Visual inspection – other than marking, check of relay outside key dimensions (ND)	4.6.2, items c) and d) – encapsulation – body – terminals – dimensions			Presoldering of terminals shall encircle the terminals without evidence of de-wetting or non-wetting; non-presoldered terminal part according to B.1 Dimensions according to outline drawing on front page. For the plug-in capability of the relay on the printed circuit board, a gauge with the respective tolerances shall be used.
* Mandatory, if stated in the detail specification.					

Subgroup B2 (period: inspection lot refers to the production volume of not more than one week)

Test No.	Test	Test conditions according to IEC 61810-7:2006	IL	AQL	Performance requirements
11	Solderability (D)	*Through-hole type:* 4.25.2, test 1 Test method 1 (test Ta, method 1) Number of terminals to be tested: all Temperature: • (245 ± 5) °C for Sn96,5Ag3Cu0,5 • (250 ± 5) °C for Sn99, 3Cu0,7 Duration: (2 ± 0,5) s Immersion: up to 1,5 mm from body *Surface mounting type:* 4.25.3, test 3	S-3	2,5	When inspected with a magnifying lens, the dipped surface shall be 95 % covered with new solder coating, the remaining 5 % may contain only small pinholes (magnification of the lens: 4 to 10 times)
M*		Temperature: (235 ± 3) °C Duration of the immersion: (3 ± 0,3) s Final measurements: Test 17 – insulation resistance			Value according to B.5
M* if not tested in subgroup C1.					

Table C.1 *(4 of 14)*

Group C
Subgroup C1 (period: one year)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
11a M*	Solderability (D)	*Through-hole type:* 4.25.3, test 1 Test method 1 (test Ta, method 1) Number of terminals to be tested: all Temperature: • (235 ± 5) °C for Sn96,5Ag3Cu0,5 • (250 ± 5) °C for Sn99,3Cu0,7 Duration: (2 ± 0,5) s Immersion: up to 1,5 mm from body *Surface mounting type:* 4.25.3, test 3 Temperature: (235 ± 3) °C Duration of the immersion: (2 ± 0,3) s Final measurements: Test 17 – insulation resistance	S-3	2,5	When inspected with a magnifying lens the dipped surface shall be 95 % covered with new solder coating, the remaining 5 % may contain only small pinholes (magnification of the lens: 4 to 10 times) Value according to B.5
12	Electrical endurance cable load (D)	4.30, Contact load: open-end cable, 10 m telephony cable n × 4 × 0,6 mm, one wire connected to the contact tested and the other three wires to ground, 48 V d.c. according to B.4 of IEC 61810-7:2006 Number of contacts loaded/tested: one change-over contact Coil voltage: rated voltage Number of cycles per s: 12,5 max. Duty factor: 1:1 Ambient temperature: 70 °C Test contact voltage: max. 6 V test Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests Test 15 – dielectric test	20	0	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table 2 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4 No breakdown or flashover Maximum leakage current: 1 mA
M* for relays manufactured with automatic facilities only, if not tested in subgroup B2 and if stated in detail specification.					

Table C.1 *(5 of 14)*

Subgroup C1 (*concluded*)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
13	Electrical endurance contact application 0 (D)	4.3 Number of contacts loaded/tested: one change-over contact Coil voltage: rated voltage Number of cycles per s: 12,5 max. Duty factor: 1:1 Ambient temperature: 70 °C Test contact voltage: max. 30 mV Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests Test 15 – dielectric test	20	0	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4 No breakdown or flashover Maximum leakage current: 1 mA
14	Electrical endurance particular application related condition if required (D)	4.30 Contact load and further conditions as specified in detail specification Contact voltage: rated voltage Number of cycles per s: 3 Duty factor: 1:1 Ambient temperature: °C Test contact voltage: max. 6 V Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests Test 15 – dielectric test	20	0	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4 No breakdown or flashover Maximum leakage current: 1 mA

Table C.1 *(6 of 14)*

Subgroup C2 (period: one year)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
15	Dielectric test (ND)	4.9 Application points and test voltage: according to Table B.1 of this specification (±15 V) Duration of test: 60 s	20	0	No breakdown or flashover Maximum leakage current: 1 mA
16	Impulse voltage test (ND)	4.10 Application points and test voltage: according to Table B.1 of this specification Consecutive pulses with the polarity reversed Frequency: 2 or 4 pulses/min Total number of pulses: 6 Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 17 – insulation resistance	5	0	 Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Value according to B.1
17	Insulation resistance (ND)	4.11 Application points:all terminals as specified in 4.11.2 Test voltage: according to B.1 of this specification Duration of test: 60 s or when steady value has been reached	20	0	Value according to B.1
18	Sealing (ND)	4.20.2 Procedure 1 (test Qc, method 2) Test liquid temperature: acc. 3.5.2 of IEC 60068-2-17:1994 Immersion time: 1 min			Failure criteria according to 3.5.5 of IEC 60068-2-17:1994

Table C.1 *(7 of 14)*

Subgroup C4 (period: two years)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
19	Electrical endurance, cable load, extended assessment (D)	4.30 Contact load: open-ended cable, 10 m telephony cable n × 4 × 0,6 mm, one wire connected to the contact tested and the other three wires to ground, 48 V d.c. according to C.4 of IEC 61810-7:2006 Number of contacts loaded/tested: one change-over contact Coil voltage: rated voltage Number of cycles per s: 12,5 Duty factor: 1:1 Ambient temperature: 70 °C Test contact voltage: max. 6 V Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests	20	0	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4
20	Electrical endurance, rated contact voltage, resistive load (D)	4.30 Contact load according to 4.30 of IEC 61810-7:2006, 125 V d.c./0,24 A Number of contacts loaded/tested: one change-over contact Coil voltage: rated voltage Number of cycles per s: 3 Duty factor: 1:1 Ambient temperature: 70 °C Test contact voltage: max. 6 V Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests	5	1	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table B.2 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4

Table C.1 *(8 of 14)*

Subgroup C4 (*concluded*)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
21	Electrical endurance, rated contact current, resistive load (D)	4.30 Contact load according to 4.30 of IEC 61810-7:2006, 24 V d.c./1 A Number of contacts loaded/tested: one change-over contact Coil voltage: rated voltage Number of cycles per s: 3 Duty factor: 1:1 Ambient temperature: 70 °C Test contact voltage: max. 6 V Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests	5	1	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table B.2 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4
22	Electrical endurance, application 0, extended assessment (D)	4.30 Number of contacts loaded/tested: one change-over contact Coil voltage: rated voltage Number of cycles per s: 12,5 Duty factor: 1:1 Ambient temperature: 70 °C Test contact voltage: max. 30 mV Test contact current: max. 10 mA Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests	20	0	Number of cycles according to Table B.4 Contact failure according to B.3.2 Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Values according to B.3.4

Table C.1 *(9 of 14)*

Subgroup C5 (period: two years)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
23	Thermal endurance (D)	4.32 Duration: 21 days Ambient temperature: 70 °C Coil voltage: rated voltage Recovery: 1 h Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests	5	0	Value according to B.3.2 Values according to Table B.2 at 23 °C Checking the relay function by monitoring the contacts
24	Climatic sequence (D)	4.15 Dry heat, 4.15.2 Temperature: 70 °C Duration: 16 h Recovery: 4 h During the last 2 h of dry heat exposure monitoring contact-circuit resistance of all contacts Number of cycles per s: 2 Duty factor: 1:1 Test contact voltage: max. 6 V d.c. or a.c. Test contact current:max. 10 mA Before the end of dry heat exposure: Test 4 – functional tests Damp heat cyclic, 4.15.3, one cycle Temperature: 55 °C Recovery: 4 h Cold, 4.15.4 Temperature: –25 °C Duration: 2 h Before the end of cold exposure: Test 4 – functional tests Damp heat cyclic, 4.15.6, one cycle Temperature: 55 °C Recovery: 4 h	10	0	Value according to B.3.2 Values according to Table B.3 at 23 °C, shall operate voltage at 70 °C Checking the relay function by monitoring the contacts Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts

Table C.1 *(10 of 14)*

Subgroup C5 (*continued*)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
24	Climatic sequence (D) *(continued)*	Final measurements: Test 17 – insulation resistance Test 3 – contact-circuit resistance Test 4 – functional tests Test 8 – visual inspection, 4.6.2, item d)			 Value according to B.1 Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contact No cracks or other deterioration
25	Damp heat, steady state (D)	4.16 Conditioning time: 21 days Final measurements: Test 17– insulation resistance Test 3 – contact-circuit resistance Test 8 – visual inspection, 4.6.2 item d)	10	0	 Value according to B.1 Value according to B.3.2 No cracks or other deterioration
26	Robustness of terminals (D)	4.24 Procedure: test Ua_2 – thrust; and test Ub – bending, method 1 Final measurements: Test 8 – visual inspection, 4.6.2, item d) Test 2 – coil resistance Test 3 – contact-circuit resistance Test 4 – functional tests	10	0	Values according to B.5 No breaking or loosening of terminals No cracks or other deterioration Values according to Table B.3 Value according to B.3.2 (initial) Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts

Table C.1 *(11 of 14)*

Subgroup C5 (*continued*)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
27	Shock (D)	4.26, method 1, functional Pulse shape and acceleration according to B.6 of this specification Application: three shocks each in operate and released condition in the two directions of the three main axes Test coil voltage: rated voltage (operate) and zero (release) Test contact voltage: max. 6 V d.c. Test contact current: max. 10 m A 4.26, method 2, survival Pulse shape and acceleration according to B.6 of this specification Application: three shocks each in operate and released condition in the two directions of the three main axes Final measurements: Test 8 – visual inspection, 4.6.2, item d) Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests	10	0	No opening of any closed contact circuit or no closing of any opened contact circuit shall exceed 100 μs No cracks or other deterioration Value according to B.3.2 (initial) Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Value according to B.3.4
28	Vibration (D)	4.28.2.1, method 1, functional Amplitude: 0,75 mm, 10 g Frequency: 10 Hz to 55 Hz Application: three directions Number of sweeps per direction: 3 Sweep rate: 1 octave/min ±10 % (Total duration: approx. 3 × 30 min) Test coil voltage: rated voltage (operate) and zero (release) Test contact voltage: max. 6 V d.c. Test contact current: max. 10 mA Final measurements: Test 8 – visual inspection, 4.6.2, item d) Test 3 – contact-circuit resistance Test 4 – functional tests Test 17 – insulation resistance	10	0	No opening of any closed contact circuit or no closing of any opened contact circuit shall exceed 10 μs No cracks or other deterioration Value according to B.3.2 (initial) Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Value according to B.1

Table C.1 *(12 of 14)*

Subgroup C5 (*continued*)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
29	Mechanical endurance (D)	4.31.3, method 2 Coil voltage: rated voltage Number of cycles per s: 10 Duty factor: 1:1 Ambient temperature: 70 °C Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests Test 5 – timing tests	20	1	Number of cycles according to B.3.3 There shall be no broken parts or other deterioration Value according to B.3.2 Value according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Value according to B.3.4
30	Overload current (contact circuits) (D)	4.34 Ambient temperature: 70 °C All contacts loaded Contact voltage: 24 V d.c. Contact current: 2,5 A Coil voltage: rated voltage Number of cycles per s: 0,3 duty factor: 1:1 Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests	5	0	Number of cycles according to Table B.4 Each operation shall be monitored There shall be no permanent deterioration Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts
31	Overload voltage (contact circuits) (D)	4.34 Ambient temperature: 70 °C All contacts loaded Contact voltage: 250 V d.c. Contact current: 0,24 A Coil voltage: rated voltage Number of cycles per s: 0,3 Duty factor: 1:1 Final measurements: Test 3 – contact-circuit resistance Test 4 – functional tests	5	0	Number of cycles according to Table B.4 Each operation shall be monitored Value according to B.3.2 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts
32	Magnetic interference (ND)	4.37, method 1, 2 or 3 Method 1: dimensions of the test coil as stated in the detail specification Method 2: mounting grid pattern as stated in the detail specification Method 3:* test conditions shall be stated in detail specification	5	0	Method 1, relay in critical position Deviation of: – operate voltage less than 20 % – release voltage less than 40 % Method 2: shall operate and shall release voltage according to Table B.2 Method 3: failure criteria according to detail specification

* Only if stated in the detail specification.

Table C.1 *(13 of 14)*

Subgroup C5 (*concluded*)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
33	Resistance to cleaning solvents (D)	4.47 Final measurements: Test 8 – visual inspection, 4.6.2 item d) Test 17 – insulation resistance Test 4 – functional tests Test 18 – sealing	10	0	Absence of defects on markings or other deterioration Value according to B.1 Value according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Failure criteria according to 3.5.5 of IEC 60068-2-17:1994
34	Fire hazard (D)	4.48, procedure according to IEC 60695-11-5 Mounting of the relay and position of flame application: critical position Duration of flame application: 10 s	10	0	Evaluation of test results according to IEC 60695-11-5:2004

Table C.1 *(14 of 14)*

Subgroup C6 (period: two years)

Test No.	Test	Test conditions according to IEC 61810-7:2006	Sample size	Acceptable number of defectives	Performance requirements
35	Weighing (ND)	4.7.2	10	0	Relay mass according to B.1
36	Thermal resistance (ND)	4.17			Value according to B.1
37	Rapid change of temperature (D)	4.19 Upper temperature extreme: +85 °C Lower temperature extreme: –40 °C Duration at each extreme: 30 min Number of cycles: 5 Final measurements: Test 8 – visual inspection, 4.6.2, item d) Test 17 – insulation resistance Test 4 – functional tests Test 3 – contact-circuit resistance	10	1	 No cracks or other deterioration Value according to B.1 Values according to Table B.3 at 23 °C Checking the relay function by monitoring the contacts Value according to B.3.2
38	Resistance to soldering heat (D)	*Through-hole type:* 4.25.3, test 2 IEC 60068-2-20:2008, test Tb, methods 1A and 1B Ageing: not required Number of terminals to be tested: all Method 1A: duration of immersion at (260 ± 5) °C: (10 ± 1) s *Surface mounting type:* 4.25.3, test 4 Ageing: not required Duration of preheating at (110 ± 10) °C, if required: 5 min a) duration of immersion at (260 ± 5) °C: (5 ± 1) s b) duration of immersion at (215 ± 3) °C: (40 ± 1) s Final measurements: Test 2 – coil resistance Test 3 – contact-circuit resistance Test 15 – dielectric test Test 17 – insulation resistance Test 18 – sealing	10	0	 Values according to Table B.3 Value according to B.3.2 No breakdown or flashover Maximum leakage current: 1 mA Value according to B.1 Failure criteria according to 3.5.5 of IEC 60068-2-17:1994

Table C.2 – Qualification approval *(1 of 3)*

Sample size min. 160

Variants of samples: coil voltage

Relays tested in groups 2 to 17 have passed group 1. Relays tested in group 3 shall be used for group 8.

Test	Conditions and requirements of test				Sample size	Accept-able number of defectives
	Test conditions according to IEC 61810-7:2006					
	Subclause	Particular test conditions	Test No. and description in Table C.1	Subgroup in Table C.1		
Group 0						
Visual inspection of stick magazines *	–		7	B1	6	0
* Mandatory, if stated in detail specification						
Group 1						
Visual inspection	4.6.2		1	A4		
Coil resistance	4.8.1		2	A4		
Contact-circuit resistance	4.12		3	A4	160	0
Functional tests	4.13		4	A4		
Timing tests	4.14		5	A4		
Sealing	4.20.2	Procedure 1, 2 or 4	A0-6	A0		
Group 2						
Check of dimensions	4.6.2		8	B1	10	0
Solderability *Through-hole type* *Surface mounting type*	4.25.2	Test 1 Test 3	11	B2		
Group 3						
Insulation resistance	4.11		17	C2	20	0
Dielectric test	4.9		15	C2		
Group 4						
Weighing	4.7.2		35	C6	5	0
Thermal resistance	4.17		36	C6		
Robustness of terminals	4.24		26	C5		

Table C.2 *(2 of 3)*

Test	Conditions and requirements of test				Sample size	Accept-able number of defectives
	Test conditions according to IEC 61810-7:2006					
	Subclause	Particular test conditions	Test No. and description in Table C.1	Subgroup in Table C.1		
Group 5						
Impulse voltage test	4.10		16	C2	5	0
Fire hazard	4.48	IEC 60695-11-5	34	C5		
Group 6						
Climatic sequence	4.15		24	C5	10	0
Resistance to soldering heat *Through-hole type* *Surface mounting type*	4.25.3	 Test 2 Test 4	38	C6		
Resistance to cleaning solvents	4.47		33	C5		
Sealing	4.20.2	Procedure 1	18	C2		
Group 7						
Damp heat, steady state	4.16		25	C5	10	0
Sealing	4.20.2	Procedure 1	18	C2		
Group 8						
Magnetic interference	4.37	Method 1, 2 or 3	32	C5	5	
Shock	4.26	Method 1	27	C5		
Vibration	4.28.2.1	Method 1	28	C5	5	0
Rapid change of temperature	4.19	Method 1	37	C6	10	
Sealing	4.20.2	Procedure 1	18	C2	20	
Group 9						
Electrical endurance, cable load	4.30	Method 1	19	C4	20	0
Group 10						
Electrical endurance, rated contact voltage	4.30	Method 1	20	C4	5	0
Group 11						
Electrical endurance, rated contact current	4.30	Method 1	21	C4	5	0

Table C.2 *(3 of 3)*

Test	Conditions and requirements of test				Sample size	Accept-able number of defectives
	Test conditions according to IEC 61810-7:2006					
	Subclause	Particular test conditions	Test No. and description in Table C.1	Subgroup in Table C.1		
Group 12						
Electrical endurance, contact application 0	4.30		22	C4	20	0
Group 13						
Electrical endurance, particular application-related condition, if required	4.30	Method 1	14	C1	20	0
Group 14						
Mechanical endurance	4.31	Method 2	29	C5	10	1
Group 15						
Thermal endurance	4.32		23	C5	10	0
Group 16						
Overload current (contact circuits)	4.34		30	C5	5	0
Group 17						
Overload voltage (contact circuits)	4.34		31	C5	5	0

Table C.3 – Industrial qualification

Test	Conditions and requirements of test				Sample size	Accept-able number of defectives
	Test conditions according to IEC 61810-7:2006					
	Subclause	Particular test conditions	Test No. and description in Table C.1	Subgroup in Table C.1		
Group 18						
Electrical endurance, miss free acceptance	4.30	Method 1	14	C1	20	0
Group 19						
Contact-circuit resistance stability	4.12		3	B4	500	1

Annex D
(informative)

Definition of subgroups

Subgroup A0: This subgroup comprises short-duration tests for features which are of vital importance to the function of the relay.

Except for certain special applications prescribed in the detail specification, 100 % testing shall be carried out as a screening or sorting function, possibly on-line, prior to the formation of lots from which samples for the other subgroups are taken.

Subgroup A1: This subgroup comprises short-duration tests for important (major) characteristics of the relay.

Subgroup A2: This subgroup comprises short-duration tests for less important (minor) characteristics of the relay.

Subgroup A3: This subgroup comprises short-duration tests for features involving a high degree of subjective judgement, such as a visual inspection.

Subgroup A4: This subgroup comprises short-duration tests for characteristics which are essentially related to design only and are of vital importance to the function of the relay.

Subgroup B1: This subgroup comprises tests of about one week's duration and applies to characteristics which are of vital importance to the function of the relay.

Subgroup B2: This subgroup comprises tests of about one week's duration for important (major) characteristics of the relay.

Subgroup B3: This subgroup comprises tests of about one week's duration which apply to characteristics which are of vital importance to the function of the relay but are essentially related to design.

Subgroup C1: This subgroup comprises tests that apply to characteristics which are of vital importance to the function of the relay. Normally, the assessment period shall not exceed 12 months.

Subgroup C2: This subgroup comprises tests that apply to important (major) characteristics of the relay. Normally, the assessment period shall not exceed 12 months.

Subgroup C3: This subgroup comprises tests that apply to less important (minor) characteristics of the relay. Normally, the assessment period shall not exceed 12 months.

Subgroup C4: This subgroup comprises tests that apply to characteristics which are of vital importance to the function of the relay. Normally, the assessment period shall not exceed two years.

Subgroup C5: This subgroup comprises tests that apply to important (major) characteristics of the relay. Normally, the assessment period shall not exceed two years.

Subgroup C6: This subgroup comprises tests that apply to less important (minor) characteristics of the relay. Normally, the assessment period shall not exceed two years.

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