

INTERNATIONAL STANDARD

IEC
61810-7

Second edition
2006-03

Electromechanical elementary relays

Part 7: Test and measurement procedures

© IEC 2006 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

XC

For price, see current catalogue

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	9
4 Test and measurement procedures	18
4.1 General	18
4.2 Deviations	18
4.3 Precision of measurement	18
4.4 Power supplies	18
4.5 Reference conditions for testing.....	19
4.6 Visual inspection and check of dimensions.....	20
4.7 Mechanical tests and weighing.....	20
4.8 Relay coil properties	21
4.9 Dielectric strength test.....	25
4.10 Impulse voltage test.....	26
4.11 Insulation resistance.....	27
4.12 Contact-circuit resistance (or voltage drop).....	28
4.13 Functional tests	29
4.14 Timing tests.....	35
4.15 Climatic tests/sequence.....	38
4.16 Damp heat, steady state	40
4.17 Thermal resistance of the coil.....	41
4.18 Heating.....	42
4.19 Rapid change of temperature	44
4.20 Enclosure	44
4.21 Internal moisture.....	46
4.22 Corrosive atmosphere	46
4.23 Mould growth.....	47
4.24 Robustness of terminals	48
4.25 Soldering.....	48
4.26 Shock.....	49
4.27 Bump.....	50
4.28 Vibration.....	51
4.29 Acceleration	52
4.30 Electrical endurance	53
4.31 Mechanical endurance.....	56
4.32 Thermal endurance.....	56
4.33 Limiting continuous current.....	57
4.34 Overload (contact circuit).....	57
4.35 Load transfer	58
4.36 Electromagnetic compatibility.....	59
4.37 Magnetic interference	60
4.38 Crosstalk and insertion loss	61
4.39 Electrical contact noise	61

4.40	Thermoelectric e.m.f.....	62
4.41	Capacitance	62
4.42	Contact sticking (delayed release)	63
4.43	Magnetic remanence	63
4.44	Acoustic noise	65
4.45	Continuity of protective earth connection.....	66
4.46	Fluid contamination	66
4.47	Resistance to cleaning solvents	67
4.48	Fire hazard	68
4.49	Temperature rise at rated load.....	68
4.50	Mechanical interlock	69
4.51	Insertion and withdrawal force (mating relay and socket).....	69
Annex A (normative)	Heating test arrangement.....	71
Annex B (normative)	Fire hazard testing	72
Annex C (normative)	Test circuit for endurance tests.....	77
Annex D (informative)	Inductive contact loads	84
Bibliography.....		86
Figure 1 – Typical circuit for the measurement of coil transient suppression.....		23
Figure 2 – Typical traces on an oscilloscope screen during transient voltage measurement.....		24
Figure 3 – Monostable non-polarized relay.....		30
Figure 4 – Monostable relay polarized by diode.....		31
Figure 5 – Monostable polarized relay with magnetic biasing.....		32
Figure 6 – Bistable non-polarized relay (not applicable to remanence relays)		33
Figure 7 – Bistable polarized relay (example)		34
Figure 8 – Typical circuit for the measurement of time parameters.....		36
Figure 9 – Typical traces on an oscilloscope screen during time measurements.....		37
Figure 10 – Test circuit for load transfer		59
Figure 11 – Mounting array for adjacent similar relays		60
Figure 12 – Directions of the test current for magnetic interference test, method 3.....		61
Figure 13 – Sequential diagram for magnetic remanence test		64
Figure 14 – Installation for the test for acoustic noise emission.....		65
Figure A.1 – Test arrangement.....		71
Figure B.1 – Glow-wire and position of the thermocouple.....		73
Figure B.2 – Glow-wire test apparatus (example).....		74
Figure B.3 – Needle flame test details		76
Figure C.1 – Standard test circuit		77
Figure C.2 – Functional block diagram.....		78
Figure C.3 – Circuit for cable load		80
Figure C.4 – Test circuit for inrush current loads (for example capacitive loads and simulated tungsten filament lamp loads) – a.c. circuits.....		81

Figure C.5 – Example for a tungsten filament lamp test for relays rated 10/100 A/250 V~/ 2,5 ms	82
Figure C.6 – Test circuit for inrush current loads (for example capacitive loads and simulated lamp loads) – d.c. circuits	82
Figure C.7 – Test circuit for inrush current loads (for example simulated fluorescent lamp loads) with power-factor correction.....	83
Table 1 – Coil voltage values and corresponding functions	29
Table 2 – Cross-sectional areas and lengths of conductors dependent on the current carried by the terminal.....	43
Table 3 – Schematics for contact loading	55
Table 4 – Test fluids and temperatures of tests	67
Table C.1 – Characteristics of power sources for contact loads.....	78
Table C.2 – Standard contact load characteristics	79
Table D.1 – Verification of the making and breaking capacity for AC-15/DC-12 (normal conditions).....	84
Table D.2 – Making and breaking capacity for electrical endurance test	85

Currently in preview, click buy full version

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL ELEMENTARY RELAYS –**Part 7: Test and measurement procedures**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct interpretation of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

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

This new edition has been revised in order to

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

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

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

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

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

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

Part 1: General and safety requirements

Part 2: Reliability

Part 7: Test and measurement procedures

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://www.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

ELECTROMECHANICAL ELEMENTARY RELAYS –

Part 7: Test and measurement procedures

1 Scope

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

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

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

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

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

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

2 Normative references

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot wire based test methods – Glow-wire apparatus and common test procedure*

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

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

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

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

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

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

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

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

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

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

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