

**Harmonized system of quality assessment
for electronic components:**

**Generic specification:
Electromechanical
all-or-nothing relays**

Part 1. General

Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques
Specification Generique : Relais
Electromecaniques de tout-ou-rien
Partie 1 : Generalites

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik
Fachgrundspezifikation: Elektromechanische
Schaltrelais
Teil 1 : Allgemeines

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Components Standards Policy Committee (ECL/-) to Technical Committee ECL/1, upon which the following bodies were represented:

Association of Control Manufacturers (TACMA (BEAMA Ltd.))
British Telecommunications plc
Electronic Components Industry Federation
Ministry of Defence
National Supervising Inspectorate
Transmission and Distribution Association (BEAMA Ltd.)

This British Standard, having been prepared under the direction of the Electronic Components Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on
1 May 1992

© BSI 1992

The following BSI references relate to the work on this standard:
Committee reference ECL/1
Draft for comment 86/29383 DC

ISBN 0 580 20203 8

Amendments issued since publication

Amd. No.	Date	Text affected

National foreword

This British Standard has been prepared under the direction of the Electronic Components Standards Policy Council. It supersedes BS CECC 16000 : 1980. It is identical with CENELEC Electronic Components Committee (CECC) 16000 : Part 1 : 1990, with Amendment 1 : 1991, 'Harmonized system of quality assessment for electronic components. Generic specification : Electromechanical all-or-nothing relays. Part 1 : General' published by the European Committee for Electrotechnical Standardization (CENELEC) Electronic Components Committee (CECC).

CECC 16000 : Part 1 was prepared by CECC Working Group 16, Relays, and the United Kingdom participation in the drafting was provided by Technical Committee ECL/1, General purpose relays.

Textual error

When adopting the text of the international standard the textual error given below was discovered. It has been marked in the text and has been reported to the CECC in a proposal to amend the text of the international standard.

In **2.2** the reference to IEC 433 (1974) should be read as IEC 443. The title given is correct.

Cross-references

The British Standard which implements the requirements of the CECC System is BS 9000 'General requirements for a system for electronic components of assessed quality' Part 2 : 1991 'Specification for the national implementation of the CECC system'.

International standard	Corresponding British Standard
ISO 3 : 1973	BS 2045 : 1965 Preferred numbers (Technically equivalent)
ISO 1000 : 1973 ¹⁾	BS 5555 : 1981 Specification for SI units and recommendations for the use of their multiples and certain other units (Identical)
ISO 60-2 : 1973 ²⁾	BS 923 Guide on high-voltage testing techniques Part 2 : 1980 Test procedures (Identical)
IEC 68 IEC 68-1 : 1982 ³⁾	BS 2011 Environmental testing Part 1.1 : 1983 General and guidance (Identical)
IEC 68-2-1 : 1974 ⁴⁾ Supplement A : 1976 Amendment 1 : 1983	Part 2.1A : 1977 with amendments : Tests A. Cold (Identical)
IEC 68-2-2 : 1974 Supplement A : 1976	Part 2.1B : 1977 with amendment : Tests B. Dry Heat (Identical)
IEC 68-2-3 : 1969 Amendment 1 : 1983	Part 2.1Ca : 1977 with amendment : Test Ca. Damp heat, steady state (Identical)

¹⁾ISO 1000 : 1973 has been superseded by ISO 1000 : 1991, which is identical with BS 5555 : 1981 'Specification for SI units and recommendations for the use of their multiples and certain other units'.

²⁾IEC 60-2 : 1973 has been superseded by IEC 60-1 : 1989, which is identical with BS 923 'Guide to high-voltage testing techniques' Part 1 : 1990 'General'.

³⁾IEC 68-1 : 1982 has been superseded by IEC 68-1 : 1988, which is identical with BS 2011 : Part 1 : 1989 'General and guidance'.

⁴⁾IEC 68-2-1 : 1974 and IEC 68-2-1A : 1976 have been superseded by IEC 68-2-1 : 1990, which is identical with BS 2011 : Part 2.1A : 1990 'Tests A. Cold'.

International standard	Corresponding British Standard
IEC 68-2-6 : 1982 Amendment 2 : 1985	Part 2.1Fc : 1983 with amendments : Test Fc. Vibration (sinusoidal) (Identical)
IEC 68-2-7 : 1983	Part 2.1Ga : 1984 Test Ga. Acceleration, steady state (Identical)
IEC 68-2-10 : 1984 ¹⁾	Part 2.1J : 1985 Test J and guidance. Mould growth (Identical)
IEC 68-2-11 : 1981	Part 2.1Ka : 1982 Test Ka. Salt mist (Identical)
IEC 68-2-13 : 1983	Part 2.1M : 1984 Test M. Low air pressure (Identical)
IEC 68-2-14 : 1984	Part 2.1N : 1985 Test N. Change of temperature (Identical)
IEC 68-2-17 : 1978	Part 2.1Q : 1981 Test Q. Sealing (Identical)
IEC 68-2-20 : 1979	Part 2.1T : 1981 Test T. Soldering (Identical)
IEC 68-2-21 : 1983	Part 2.1U : 1984 Test U. Robustness of terminations and integral mounting devices (Identical)
IEC 68-2-27 : 1972 ²⁾ Amendment 1 : 1982 Amendment 2 : 1983	Part 2.1Ea : 1977 with amendments : Test Ea. Shock. (Identical)
IEC 68-2-29 : 1968 ³⁾ Amendment 1 : 1982 Amendment 2 : 1983	Part 2.1Eb : 1977 with amendments : Test Eb. Bump (Identical)
IEC 68-2-30 : 1980	Part 2.1Db : 1981 Test Db and guidance. Damp heat, cyclic (12 + 12 hour cycle) (Identical)
IEC 68-2-34 : 1973	Part 2.1Fd : 1973 Test Fd. Random vibration wide band, general requirements (Technically equivalent)
IEC 68-2-35 : 1973	Part 2.1Fda : 1973 Test Fda. Random vibration — wide band reproducibility high (Technically equivalent)
IEC 68-2-36 : 1973	Part 2.1Fdb : 1973 Test Fdb. Random vibration — wide band reproducibility medium (Technically equivalent)
IEC 68-2-37 : 1973	Part 2.1Fdc : 1973 Test Fdc. Random vibration — wide band reproducibility low (Technically equivalent)
IEC 68-2-45 : 1980	Part 2.1XA : 1981 Test XA and guidance. Immersion in cleaning solvents (Identical)
IEC 68-2-46 : 1982	Part 2.2Kd : 1984 Test Kd. Guidance on Test Kd : Hydrogen sulphide test for contacts and connections (Identical)
IEC 68-2-47 : 1982	Section 4.1 : 1983 Specification for mounting of components, equipment and other articles for dynamic tests (Identical)

¹⁾IEC 68-2-10 : 1972 has been superseded by IEC 68-2-10 : 1988, which is identical with BS 2011 : Part 2.1J : 1989 'Test J and guidance. Mould growth'.

²⁾IEC 68-2-27 : 1972 has been superseded by IEC 68-2-27 : 1987, which is identical with BS 2011 : Part 2.1Ea : 1988 'Test Ea. Shock'.

³⁾IEC 68-2-29 : 1968 has been superseded by IEC 68-2-29 : 1987, which is identical with BS 2011 : Part 2.1Eb : 1987 'Test Eb. Bump'

International standard	Corresponding British Standard
IEC 144 : 1963	BS 5420 : 1977 Specification for degrees of protection of enclosures of switchgear and controlgear for voltages up to and including 1000 V a.c. and 1200 V d.c. (Identical)
IEC 255	BS 5992 Electrical relays
IEC 255-0-20 : 1974	Part 1 : 1980 Specification for contact performance of electrical relays (Identical)
IEC 255-5 : 1977	Part 3 : 1980 Specification for the insulation testing of electrical relays (Identical)
IEC 255-14 : 1981	Part 4 : 1983 Specification for contact loads of preferred values used in endurance tests for electrical relay contacts (Identical)
IEC 255-15 : 1981	Part 5 : 1983 Specification for test equipment used in endurance tests for electrical relay contacts (Identical)
IEC 410 : 1973	BS 6001 Sampling procedures for inspection by attributes Part 1 : 1991 Specification for sampling plans indexed by acceptable quality level (AQL) for lot by lot inspection (Technically equivalent)
IEC 443 : 1974	BS 5148 : 1975 Method for specifying the performance of stabilized power supply apparatus (Technically equivalent)
IEC 695	BS 6458 Fire hazard testing for electrotechnical products
IEC 695-2	Part 2 Methods of test
IEC 695-2-1 : 1980	Section 2.1 : 1984 Glow-wire test (Identical)
IEC 695-2-2 : 1980	Section 2.2 : 1984 Needle-flame test (Identical)
CECC 00109 : 1974	BS CECC 00109 : 1991 Rule of Procedure 9 — Certified test records (Identical)

The Technical Committee has reviewed the provisions of IEC 27-1, IEC 68-2-49, IEC 117, IEC 147-5, CCITT Volume IX Rec K17, CECC 00107 and MIL-STD-202 Method 213, for which there are no equivalent British Standards and has decided that they are acceptable for use in conjunction with this British Standard.

IEC 117 has been superseded by IEC 617 'Graphical symbols for diagrams' of which most Parts are identical with BS 3939 'Guide for graphical symbols for electrical power, telecommunication and electronics diagrams'.

IEC 147-5 has been superseded by IEC 749 which is identical with BS 6493 'Semiconductor devices' Part 3 : 1985 'Mechanical and climatic test methods'.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Förderverein für Elektrotechnische Normung (FEN) e. V.
Cenelec Electronic Components Committee

CECC

Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques

SPECIFICATION GNERIQUE:

RELAIS ELECTROMECHANQUES DE TOUT-OU-RIEN

PARTIE I: GENERALITES

Harmonized System of Quality Assessment for
Electronic Components

GENERIC SPECIFICATION:

ELECTROMECHANICAL ALL-OR-NOTHING RELAYS

PART I: GENERAL

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik

FACHGRUNDSPEZIFIKATION:

ELEKTROMECHANISCHE SCHALTRELAIS

TEIL I: ALLGEMEINES



2

Edition
Issue
Ausgabe

Partie I de la
Part I of
Teil I von

CECC 16 000



Documents

Document Sharing Hub

CONTENTS

	Page
Foreword	4
Preface	4
SECTION 1 - SCOPE	5
SECTION 2 - GENERAL	5
2.1 Order of precedence	5
2.2 Related documents	5
2.3 Units, symbols, and terminology	7
2.4 Preferred values	7
2.5 Marking	7
SECTION 3 - TERMS AND DEFINITIONS	
3.1 Types of relays	8
3.2 Types of relays, based on environmental protection	8
3.3 Functions of a relay	9
3.4 Types of contacts	10
3.5 Prefixes for the values applicable to relays	10
3.6 Energization values	11
3.7 Electrical properties of contacts	12
3.8 Categories of application of contacts	13
3.9 Mechanical properties of contacts	13
3.10 Terms relating to times	14
3.11 Coil transient suppression device	15
SECTION 4 - QUALITY ASSESSMENT PROCEDURES	
4.1 Primary stage of manufacture	16
4.2 Structurally similar components	16
4.3 Eligibility for Qualification approval	16
4.4 Quality conformance inspection	16
4.5 Division into groups	16
4.6 Resubmission of rejected lots	17
4.7 Certified test records	17
4.8 Delivery of relays subjected to tests	17
4.9 Delayed delivery	17
4.10 Supplementary procedure for deliveries	17
4.11 Unchecked parameters	17
4.12 Release for delivery before the completion of Group B tests	18
4.13 Screening procedures	18
SECTION 5 - TEST AND MEASUREMENT PROCEDURES	
5.1 General	19
5.2 Alternative methods	19
5.3 Precision of measurement	19
5.4 Requirements in detail specifications	19
5.5 Standard conditions for testing	19
5.6 Visual inspection and check of dimensions	21
5.7 Mechanical tests and weighing	22
5.8 Relay coil properties	22
5.9 Dielectric test	24

5.10	Impulse voltage test	25
5.11	Insulation resistance	26
5.12	Contact-circuit resistance (or voltage drop)	26
5.13	Functional tests	28
5.14	Timing tests	30
5.15	Climatic sequence	32
5.16	Damp heat, steady state	35
5.17	Thermal resistance	36
5.18	Heating	37
5.19	Rapid change of temperature	38
5.20	Enclosure	38
5.21	Internal moisture	39
5.22	Corrosive atmospheres	40
5.23	Mould growth	40
5.24	Robustness of terminals	41
5.25	Soldering	41
5.26	Shock	42
5.27	Bump	43
5.28	Vibration	44
5.29	Acceleration	45
5.30	Electrical endurance	46
5.31	Mechanical endurance	51
5.32	Thermal endurance	52
5.33	Limiting continuous current	53
5.34	Overload (contact circuits)	53
5.35	Load transfer	54
5.36	Electromagnetic compatibility	55
5.37	Magnetic interference	55
5.38	Cross-talk and insertion loss	56
5.39	Electrical contact noise	56
5.40	Thermo-electric e.m.f.	57
5.41	Capacitances	57
5.42	Contact sticking	57
5.43	Magnetic remanence	58
5.44	Acoustic noise	59
5.45	Continuity of protective earth connection	59
5.46	Fluid contamination	59
5.47	Resistance to cleaning solvents	60
5.48	Fire hazard	61
5.49	Free particle noise test	62

DRAWINGS

Figures 1 - 5 Performance diagrams

Fig. 1	Monostable non-polarized relay	63
Fig. 2	Monostable relay polarized by diode	64
Fig. 3	Monostable polarized relay with magnetic biasing	64
Fig. 4	Bistable non-polarized relay	65
Fig. 5	Bistable polarized relay	65

Figures 6 - 7 Time measurement

Fig. 6	Typical circuit for the measurement	66
Fig. 7	Typical traces on an oscilloscope screen	67

Fig. 8	Test circuit for load transfer	68
Fig. 9	Mounting array for adjacent similar relays	68
Fig. 10	Typical circuit for the measurement of coil transient suppression	69
Fig. 11	Typical traces on an oscilloscope screen during transient voltage measurement	70

ANNEX 1 - FREE PARTICLE NOISE TEST

A 1	Purpose	71
A 2	Apparatus	71
A 3	Procedure	72
A 3.1	Test equipment set up	72
A 3.2	Test equipment checkout	73
A 3.3	Test parameters	74
A 3.4	Test sequence	74
A 3.5	Mounting requirements	74
A 3.6	Test monitoring	75
A 3.7	Co-test shock application	76
A 3.8	Additional test cycles	76
A 3.9	Failure criteria	76
A 4	Summary	76

Drawings

Figure 217-1	Typical PIND system	77
Figure 217-2	Typical sensitivity test unit	77
Figure 217-3	Representative oscilloscope traces	78

FOREWORD

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized specifications for ELECTRO-MECHANICAL ALL-OR-NOTHING RELAYS. It should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

PREFACE

This sectional specification was prepared by CECC WG 16 "Relays".

It is based, wherever possible, on the publications of the International Electrotechnical Commission.

The text of this specification was circulated to the CECC for voting in the document indicated below and was ratified by the President of the CECC for printing as a CECC Specification.

<u>Document</u>	<u>Date of Voting</u>	<u>Report on the Voting</u>
CECC (Secretariat) 1993	Dec 1986	CECC (Secretariat) 2259
CECC (Secretariat) 2260	May 1988	CECC (Secretariat) 2437

This specification is published initially in English and German. The French text will follow as soon as it has been prepared.

Note: This specification does not conform completely with the requirements of CECC 00 400.

EFFECTIVE DATE

This Issue 2 shall become effective for all new applications for qualification approval from 15 December 1990. Issue 1 will continue to remain effective to cover all past approvals.

SECTION 1 - SCOPE

This generic specification applies to electromechanical all-or nothing relays of assessed quality.

SECTION 2 - GENERAL

2.1 Order of precedence

Where any discrepancies occur for any reasons, documents shall rank in the following order of authority:

- 1 the detail specification,
- 2 the sectional specification,
- 3 the generic specification,
- 4 document CECC 00 100, or any other international documents (for example, of the IEC) to which reference is made.

The same order of precedence shall apply to equivalent national documents.

2.2 Related documents

Reference to the following documents is made in this specification:

ISO 1000	(1973)	SI units and recommendations for the use of their multiples and of certain other units.
IEC 27-1	(1976)	Letter symbols to be used in electrical terminology. General.
IEC 50		International Electrotechnical Vocabulary
IEC 60-2	(1973)	High voltage test techniques, Part 2: Test procedures
IEC 68-1	(1982)	Basic environmental testing procedures.
IEC 68-2-1	(1974) (1976) (1983)	Test A, Cold Supplement, IEC 68-2-1A Amendment No 1
IEC 68-2-2	(1974) (1976)	Test B, Dry heat Supplement, IEC 68-2-2A
IEC 68-2-3	(1969) (1984)	Test Ca, Damp heat, steady state Amendment No 1
IEC 68-2-6	(1982) (1985)	Test Fc, Vibration (Sinusoidal) Amendment No 2
IEC 68-2-7	(1983)	Test Ga, Acceleration, steady state
IEC 68-2-10	(1984)	Test J, Mould growth
IEC 68-2-11	(1981)	Test Ka, Salt mist
IEC 68-2-13	(1983)	Test M, Low air pressure
IEC 68-2-14	(1984)	Test N, Change of temperature
IEC 68-2-17	(1978)	Test Q, Sealing

IEC 68-2-20	(1979)	Test T, Soldering
IEC 68-2-21	(1983)	Test U, Robustness of terminations and integral mounting devices
IEC 68-2-27	(1972) (1982) (1983)	Test Ea, Shock Amendment No 1 Amendment No 2
IEC 68-2-29	(1968) (1982) (1983)	Test Eb, Bump Amendment No 1 Amendment No 2
IEC 68-2-30	(1980)	Test Db, Damp heat, cyclic
IEC 63-2-34	(1973)	Test Fd, Random vibration wideband, general requirements
IEC 68-2-35	(1973)	Test Fda, Random vibration wideband, reproducibility high
IEC 68-2-36	(1973)	Test Fdb, Random vibration wideband, reproducibility medium
IEC 68-2-37	(1973)	Test Fdc, Random vibration wideband, reproducibility low
IEC 68-2-45	(1980)	Test XA, Immersion in cleaning solvents
IEC 68-2-46	(1982)	Guidance to test Kd
IEC 68-2-47	(1982)	Tests; Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb,) vibration (Fc and Fd), steady-state acceleration (Ga) and guidance
IEC 68-2-49	(1983)	Guidance to test Kc
IEC 117		Recommended graphical symbols
IEC 144	(1963)	Degrees of protection of enclosures for low-voltage switchgear and controlgear
IEC 147-5	(1977)	Essential ratings and characteristics of semiconductor devices, Part 5, Test methods
IEC 255		Electrical relays
IEC 255-0-20	(1974)	Contact performance of electrical relays
IEC 255-5	(1977)	Insulation tests for electrical relays
IEC 255-14	(1981)	Endurance tests for electrical relay contacts, preferred values for contact loads
IEC 255-15	(1981)	Endurance tests for electrical relay contacts, specification for the characteristics of test equipment
IEC 410	(1973)	Sampling plans and procedures for inspection by attributes (see CECC 00 007)
* IEC 433	(1974)	Stabilized supply apparatus for measurement
IEC 695		Fire hazard testing The following parts are referenced:

* See national foreword for details of textual error.

IEC 695-2-1	(1980)	Glow-wire test and guidance
IEC 695-2-2	(1980)	Needle-flame test
IEC 50	(1983)	International Electrotechnical Vocabulary (IEV) Chapter 446: Electrical Relays
CCITT, Volume IX, Rec. K 17		
CECC 00 007	(1973)	Basic Specification: Sampling plans and procedures for inspection by attributes
CECC 00 100	(1974)	Basic Rules
CECC 00 107	(1977)	Rule of Procedure 7: Quality assessment procedures (with amendment 1 to RP 7)
CECC 00 109	(1974)	Rule of Procedure 9: Certified test records

2.3 Units, symbols, and terminology

Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following documents:

ISO 1000	SI units and recommendations for the use of their multiples and of certain other units.
IEC 27-1	Letter symbols to be used in electrical technology, Part 1: General
IEC 50	International Electrotechnical Vocabulary
IEC 117	Recommended graphical symbols

2.4 Preferred values

Preferred values shall be stated in the sectional specifications. They shall, as far as possible, adopt the relevant standard values of IEC 255

2.5 Marking

The sectional or detail specifications shall indicate the identification criteria and other information to be shown on the relay and/or packing. The letter or colour code shall be described in full or reference made to the appropriate specifications. The order of priority for marking small relays shall be specified.

The marking shall, as a minimum, consist of

- the trade mark or the manufacturer's name
- the relay type and variants' code
- the coded date of manufacture, quantified by months or less.

SECTION 3 - TERMS AND DEFINITIONS

The following paragraphs contain specific additional terminology applicable to electromechanical all-or-nothing relays, and shall be included in each national harmonized specification.

3.1 Types of relays

3.1.1 Electromechanical relay

An electrical relay, in which the designed response is developed by the relative movement of mechanical elements under the action of a current in the input circuits.

3.1.2 All-or-nothing relay

An electrical relay, which is intended to be energized by a quantity, whose value is either:

- higher than that at which it operates
- or lower than that at which it releases.

Note: The adjective "all-or-nothing" can be deleted when no ambiguity may occur.

3.1.3 Monostable relay

An electrical relay which, having responded to an input energizing quantity (or characteristic quantity) and having changed its condition, returns to its previous condition when the quantity is removed.

3.1.4 Bistable relay

An electrical relay which, having responded to an input energizing quantity (or characteristic quantity) and having changed its condition, remains in that condition after the quantity has been removed. Another appropriate further energization is required to make it change over.

3.1.5 Polarized relay

A relay, the change of condition of which, depends upon the direction of its input energizing quantity (or quantities).

3.1.6 Non-polarized relay

A relay, the change of condition of which does not depend upon the direction of its input energizing quantity (or quantities).

3.2 Types of relays, based upon environmental protection

RT 0 Unenclosed relay

A relay not provided with a protective case.

RT I Dust protected relay

A relay provided with a case which protects its mechanism from dust.

RT II Flux proof relay

A relay capable of being automatically soldered without allowing the migration of solder fluxes beyond the intended areas.

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

RT III Wash tight relay

A relay capable of being automatically soldered and subsequently undergoing a washing process to remove flux residues without allowing the ingress of flux or washing solvents.

Note: In service this type of relay is sometimes vented to the atmosphere.

RT IV Sealed relay

A relay provided with a case which has no venting to the outside atmosphere, and having a time constant better than 2×10^4 s

RT V Hermetically sealed relay

A sealed relay having an enhanced level of sealing, assuring time constant better than 2×10^6 s.

3.3 Functions of a relay

3.3.1 Release condition

For a monostable relay, the specified condition of the relay when it is not energized. For a bistable relay, the conventional condition as declared by the manufacturer.

3.3.2 Operate condition

For a monostable relay, the specified condition of the relay when it is appropriately energized.

For a bistable relay, the alternative condition to the release condition as declared by the manufacturer.

3.3.3 To operate

A relay operates when it changes from its release condition to its operate condition.

3.3.4 To release

A relay releases when it changes from its operate condition to its release condition.

3.3.5 To change over

A relay changes over when it operates or releases.

3.3.6 To cycle

A relay cycles when it operates and then releases, or vice-versa.

3.3.7 To revert

For a particular polarized relay being in an operate condition, to change from this condition to the release condition by increasing the value of the energizing quantity.

3.3.8 To revert reverse

For a particular bistable polarized relay being in a release condition by an appropriate energization, to change from this condition to the operate condition by increasing the value of this energizing quantity.

3.4 Types of contacts

3.4.1 Make contact

A contact which is closed when the relay is in its operate condition and which is open when the relay is in its release condition.

3.4.2 Break contact

A contact which is open when the relay is in its operate condition and which is closed when the relay is in its release condition.

3.5 Prefixes for the values applicable to relays

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

3.5.1 Rated value

Value of a quantity assigned, generally by a manufacturer, for a specified operating condition of a relay.

3.5.2 **Actual ("just") value**

Value of a quantity determined by measurement on a single relay, when it just performs a specified function.

3.5.3 **Test ("must") value**

Value of a quantity with which, during tests, the relay is required to perform or not to perform a specified function.

3.5.4 **Characteristic value**

Value of a quantity with which, throughout its lifetime or a specified number of cycles, the relay is required to comply with a specified requirement.

3.6 **Energization values**

3.6.1 **Energizing quantity**

An electrical quantity (either current or voltage or power) which alone, or in combination with other such quantities applied to a relay under specified conditions, enables it to fulfil its purpose.

3.6.2 **Rated value of an energizing quantity**

Value of an energizing quantity to which some of the specified characteristics are referred.

3.6.3 **Actual ("just") value of an energizing quantity**

Value of an energizing quantity determined by measurement on a single relay, when it just performs a specified function.

3.6.4 **Test ("must") value of an energizing quantity**

Value of an energizing quantity at which, during tests, the relay is required to perform or not to perform a specified function.

3.6.5 **Characteristic value of an energizing quantity**

Value of an energizing quantity with which, throughout its lifetime or a specified number of cycles, the relay is required to comply with a specified requirement.

3.6.6 **Operative range of an energizing quantity**

The range of values of an energizing quantity for which the relay under specified conditions is able to perform its intended function(s) according to the specified requirements.

For the following terms refer also to Figures 1 to 5 which show the sequential functions of relays covered by the definitions.

3.6.7 **Magnetic preconditioning value**

Value of the energizing quantity at which the relay attains a defined magnetic condition.

- Notes:
1. For polarized relays, distinction is made between preconditioning in forward (operate) direction, and preconditioning in reverse direction.
 2. For bistable relays, preconditioning may also be used to set the relay to a defined position.

3.6.8 **Non-operate value**

Value of the energizing quantity at which a relay does not operate.

3.6.9 **Operate value**

Value of the energizing quantity at which a relay operates.

3.6.10 **Non-release value**

Value of the energizing quantity at which a relay does not release.

3.6.11 **Release value**

Value of the energizing quantity at which a relay releases.

3.6.12 **Non-revert value**

Value of the energizing quantity exceeding the operate value at which a particular polarized relay does not revert.

3.6.13 **Reverse non-revert value**

Value of the energizing quantity exceeding the release value, at which a particular bistable polarized relay does not revert reverse.

3.6.14 **Reverse polarity value**

Value of the energizing quantity of reverse polarity at which a polarized monostable relay does not operate.

3.7 **Electrical properties of contacts**

3.7.1 **Contact current**

The current which a relay contact carries before opening or after closing.

3.7.2 **Contact voltage**

The voltage between the contact members before closing or after opening.

3.7.3 **Limiting continuous current**

The highest value of the current (r.m.s. if a.c.), which a previously closed contact circuit is capable of carrying continuously.

3.7.4 **Contact noise**

The spurious voltage which appears across the terminations of a closed contact.

3.8 **Categories of application of contacts**

3.8.1 **Contact application 0**

A contact characterized by a maximum contact voltage of 30 mV, and a maximum contact current of 10 mA.

3.8.2 **Contact application 1**

A contact characterized by a contact voltage between 30 mV and 60 V, and a contact current between 10 mA and 0,1 A.

3.8.3 **Contact application 2**

A contact characterized by a contact voltage between 5 V and 250 V, and a contact current between 0,1 A and 1 A.

3.8.4 **Contact application 3**

A contact characterized by a contact voltage between 5 V and 600 V, and a contact current between 0,1 A and 100 A.

Note: A contact may have the characteristics of more than one category.

3.9 **Mechanical properties of contacts**

3.9.1 **Contact gap**

The gap between the contact tips (points) under specified conditions when the contact circuit is open.

3.9.2 **Contact force**

The force which two contact tips (points) exert against each other in the closed position under specified conditions.

3.10 Terms relating to times

The operate time, release time, reverse operate time, transfer time and bridging time, as defined hereunder, do not include bounce times.

The operate time covers the closing time of a make contact and the opening time of a break contact.

The release time covers the opening time of a make contact and the closing time of a break contact.

3.10.1 Operate time

The interval of time between the application of the operate value and the first closing (or opening) of the contact circuit.

3.10.2 Release time

The interval of time between the application of the release value and the first opening (or closing) of the contact circuit.

3.10.3 Transfer time

For a break-before-make change over contact, the time interval during which both contact circuits are open.

3.10.4 Bridging time

For a make-before-break change over contact, the time interval during which both contact circuits are closed.

3.10.5 Bounce time

For a contact which is closing (opening) its circuit, the time interval between the instant when the contact circuit first closes (opens) and the instant when the circuit is finally closed (opened).

3.10.6 Time to stable closed condition

The time interval between the instant when a specified value of the energizing quantity is applied and the instant when a contact circuit fulfills specified requirements.

3.10.7 Minimum time of operate energization

Minimum duration of application of rated operate value required to ensure that the contact circuit fulfills specified requirements.

3.10.8 Contact time difference

For a relay having several contacts of the same type, the difference between the maximum value of the operate (release) time and the minimum value of the operate (release) time.

3.11

Coil transient suppression device

A device connected to the relay coil for to limit its back e.m.f. to a prescribed value.

SECTION 4 - QUALITY ASSESSMENT PROCEDURES

4.1 Primary stage of manufacture

The primary stage of manufacture shall be defined in each sectional specification.

4.2 Structurally similar components

The sectional specification shall define those relays within its scope which may be considered as structurally similar.

4.3 Eligibility for Qualification Approval (see CECC 00 107)

The manufacturer shall comply with:

4.3.1 the general requirements of the basic rules governing qualification approval

and

4.3.2 the requirements for the primary stage of manufacture contained in 4.1.

In addition, the manufacturer shall comply with the requirements given in the sectional and detail specifications.

4.4 Quality conformance inspection (see CECC 00 107)

The sectional specification shall prescribe the test schedule which shall be included in each blank detail specification for those relays covered by the scope of the sectional specification.

This schedule shall also specify the division into Sub-Groups for the purpose of lot-by-lot and periodic inspection.

A sectional specification may specify more than one schedule which can be applied to differing categories or levels.

4.5 Division into groups

The blank detail specification shall show the order in which the tests or conditions in the Sub-Group 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 Sub-Group is to be observed. Where a Sub-Group contains a destructive test, this shall either be stated in full or the symbol "D" shall be placed alongside of the title of the Sub-Group in the schedule of inspection requirements in the blank detail specification.