
Electrical relays

Part 1. Specification for contact performance of electrical relays

Relais électriques

Partie 1. Spécification des caractéristiques fonctionnelles des contacts de relais électriques

Elektrische Relais

Teil 1. Spezifikation für die Kontaktleistung von elektrischen Relais

National foreword

This Part of this British Standard, which has been prepared under the direction of the General Electrotechnical Engineering Standards Committee, is identical with IEC Publication 255-0-20 'Contact performance of electrical relays', published in 1974 by the International Electrotechnical Commission (IEC).

Those Parts of IEC Publication 255 'Electrical relays' which are concerned primarily with protection relays are incorporated where required into BS 142 : 1980 'Specification for electrical protection relays'. All other Parts of IEC Publication 255 which are implemented as British Standards form, or will form, Parts of this British Standard.

In the UK, it has been found necessary to supplement this standard in the case of electrical protection relays. The additional requirements for the contact performance of electrical protection relays are specified in BS 142.

Classification of relay standards. Some Parts of IEC Publication 255 are designated first level documents, i.e. they cover the requirements of all relays within the scope of IEC Technical Committee No. 41, Electrical relays. Other Parts of IEC Publication 255 are designated lower level documents, i.e. they are concerned with the requirements of a family of relays (second level) and of smaller and more specialized groups of relays within such a family (third and fourth level).

According to this system of classification, this is a first level document.

Terminology and conventions. The text of the international standard has been approved as suitable for publication, without deviation, as a British Standard. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

Wherever the word 'recommendation' appears, referring to this standard, it should be read as 'British Standard'.

Cross-references. Where reference to other Parts of IEC Publication 255 is made, the appropriate Part of this standard or of BS 142 : 1980 should be consulted, as applicable. Although some Parts of IEC Publication 255 have not been implemented as British Standards, the committee responsible for the preparation of this standard is satisfied that any particular technical requirements which may have been invoked from those Parts of the international standard are fully acceptable for the purposes of this British Standard.

Currently, the other published Parts of BS 5992 are as follows.

International standard	Corresponding British Standard
IEC 255-1-00 : 1975 (second level document)	BS 5992 Electrical relays Part 2 : 1980 Specification for all-or-nothing electrical relays (Identical)
IEC 255-5 : 1977 (first level document)	Part 3 : 1980 Specification for the insulation testing of electrical relays (Identical)

For other international standards referred to in the text, the corresponding British Standards are as follows.

International standard	Corresponding British Standard
IEC 85 : 1957	BS 2757 : 1956 Classification of insulating materials for electrical machinery and apparatus on the basis of thermal stability in service (Technically equivalent)

The technical committee has reviewed the provisions of IEC 410, to which reference is made in 5.2.1, and has decided that they are acceptable for use in conjunction with this standard. The related British Standard is BS 6001 'Sampling procedures and tables for inspection by attributes'.

In 3.4 reference is made to the International Electrotechnical Vocabulary (IEC 50). The appropriate definition is as follows:

Duty factor in intermittent periodic duty or in continuously running duty with intermittent loading : The ratio of the duration of the period of working under load to the duration of the cycle; it is included between 0 and 1 and can also be expressed as a percentage.

The relevant related British Standard for the International Electrotechnical Vocabulary is BS 4727 'Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms' Part 1 : Group 03 'Relay terminology'.

In 4.3.2 a) reference is made to a specific part of IEC 255-3 and IEC 255-4. The appropriate information is given in 14.1.1 of BS 142 : Part 2.1 : 1980.

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British Standard

Electrical relays

Part 1. Specification for the contact performance of electrical relays

1. General

1.1 *Scope*

This recommendation is applicable to contact assemblies of relays within the scope of the IEC. It covers basic considerations which are, in general, common to all types of relays covered by IEC Publication 255, Electrical Relays, but supplementary requirements may be necessitated by specific designs or application.

It applies only to relays in a new condition.

Note. — This first publication is based on certain types of relays (e.g. general purpose relays) and will be expanded in future editions as more data becomes available.

1.2 *Object*

The object of this recommendation is to state, for relay contact assemblies:

- definitions of terms used,
- preferred rated values,
- preferred test conditions,
- basic criteria of contact failure,
- assessment of performance data,
- presentation of performance data.

2. Definitions

For the purpose of this recommendation, the following definitions shall apply:

Note. — For definitions of general terms not defined in this recommendation, reference should be made to the other parts of Publication 255 and to the IEC International Electrotechnical Vocabulary.

2.1 *Contact circuit* (see A, Figure 1, page 10)

The whole of the electrically conductive parts of a relay which are intended to be connected to a given external circuit which is to be closed or opened by the relay.

Note. — A change-over contact involves two contact circuits.

2.2 *Contact assembly* (see B, Figure 1)

An assembly of contact members, with their insulation, which close or open their contact circuit by their relative movement.

2.3 *Contact member* (see C, Figure 1)

A conductive part of a contact assembly which is electrically isolated from other such parts when the contact circuit is open.

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2.4 Contact tip (see D, Figure 1)

A conductive part of a contact member designed to co-act with another to close the contact circuit.

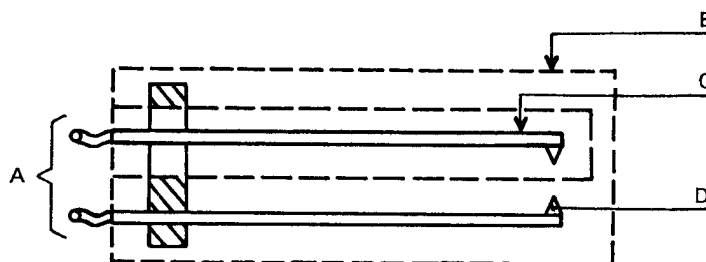


FIGURE 1

2.5 Make contact

A contact which is open when the relay is in its unenergized condition and which is closed when the relay is in an energized condition.

2.6 Break contact

A contact which is closed when the relay is in its unenergized condition and which is open when the relay is in an energized condition.

2.7 Contact gap

The gap between the contact tips, under specified conditions, when the contact circuit is open.

2.8 Contact force

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

2.9 Limiting continuous current of a contact circuit *

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

2.10 Limiting short-time current of a contact circuit *

The highest value of current which a previously closed contact circuit is capable of carrying for a specified short period under specified conditions.

2.11 Limiting making capacity *

The highest value of current which a contact assembly is capable of making under specified conditions.

2.12 Limiting breaking capacity *

The highest value of current which a contact assembly is capable of breaking under specified conditions.

2.13 Limiting cycling capacity *

Under consideration.

2.14 Bounce

Contact tips bounce when, after having touched each other for the first time, they separate transiently one or more times before definitively closing the contact circuit.

Note. — Bounce can also occur during the opening of contacts. This is under consideration.

* The limiting values (see Sub-clauses 2.9, 2.10, 2.11, 2.12 and 2.13) may be greater than the corresponding rated values.

2.15 *Bounce time*

For a contact which is closing its circuit, the time which elapses between the instant when the contact circuit is first closed and the instant when the circuit is finally closed. It applies at a specified value of the energizing quantity and for a specified load on the contacts.

Note. — Bounce can also occur during the opening of contacts. This is under consideration.

2.16 *Contact follow (contact over-travel)*

Under consideration

2.17 *Contact wipe*

Under consideration.

Additional definitions are under consideration.

3. **Standard rated values**

Standard rated values for contact circuits given below are selected from other parts of IEC Publication 255.

Values indicated as preferred have been chosen so as to minimize test conditions and to provide reference values for comparison of data.

3.1 *Rated voltages*

Preferred values:

— d.c.: 12 24 48 60 110 125 220 V,

— a.c.: 12 24 48 110 220 V (r.m.s.).

Other voltages are acceptable, but have not been preferred in this document.

3.2 *Rated currents*

For rated continuous currents, a.c. and d.c.:

1 1.25 1.6 2 2.5 3.15 4 5 6.3 8

or the decimal multiples or submultiples of these figures in amperes. 1, 2 and 5 are preferred values.

For rated making, breaking and cycling capacity, no values are listed.

3.3 *Frequency of operation*

Preferred values (cycles per hour):

6 30 120 600 1 200 1 800 3 600 7 200 12 000 18 000 36 000
45 000 72 000 90 000 108 000 180 000 360 000 720 000

3.4 *Duty factor* (see 10-05-395 of the International Electrotechnical Vocabulary, Chapter 10).

Unless otherwise stated by the manufacturer, the duty factor referring to the energizing circuits shall be 50%.

4. **Test conditions**

4.1 *General*

a) At the commencement of each test, the relay, including contacts, shall be in an effectively new and clean condition in so far as the given test is concerned, unless otherwise stated by the manufacturer.

b) The relay shall be mounted in the manner intended for normal service, in its case and with cover, if any, in position.

c) Ambient temperature for make, break and cyclic tests shall be stated by the manufacturer and shall be not less than the reference value.

- d) Ambient temperature for continuous tests: at the upper limit of the nominal range of temperature.
- e) Relative humidity: 45% to 75%.
- f) All other influencing quantities and factors shall be at their reference values as given in IEC Publication 255.
- g) The atmosphere shall be sensibly free from dust and other contaminations.
- h) When lubricants or other preparations are recommended by the manufacturer, they should be applied before commencing the test.
- i) During any given sequence of tests, the contacts should be neither cleaned nor touched.
- j) The rate of testing shall not exceed that stated by the manufacturer. It shall be such that there is no harmful cumulative heating of the contacts or harmful cumulative ionization within the relay case.
- k) When testing on a.c. loads, actuation of the relay shall ensure that mechanical contact operation is random with respect to the point on the wave (voltage for make duty, current for break duty).
- l) All specified protective devices or quenching circuits which are part of the relay design, or stated by the manufacturer as necessary for particular contact ratings, should be in position during tests.
- m) If the relay has a device or circuit for suppressing radio interference frequencies, this device shall be included in the contact circuits during contact tests.
- n) During the life test, the test facilities shall be so arranged as to provide the degree of monitoring and/or control required by the test clauses.
- o) The length and arrangements of all the test circuit leads can affect the contact performance of the contacts and must be agreed upon between manufacturer and user. Short test leads may be necessary for resistive loads to minimize the effects of stray capacitance. The leads shall have such a cross section that no significant heat is conducted from the test cables to the contact or vice versa (see also Appendix A).

4.2 Test circuit

The test circuit shall be in accordance with Appendix A unless otherwise agreed. The test conditions, standard values, etc., shall preferably be selected from those given in Clause 3 and Table I, page 17, but other values, e.g. lower voltages for duty level categories I and II given in Appendix B, may also be used.

The declared value of the current shall be expressed in terms of the steady-state (r.m.s. if a.c.) value of current in the contact circuit.

4.3 Relay energization

The following conditions are applicable unless other values are specified in the appropriate part of IEC Publication 255.

4.3.1 All-or-nothing relays

a) Energizing quantities

For making, breaking and cycling capacity tests, the relay shall be energized with the rated values of input and auxiliary energizing quantities ($\pm 2\%$). The value of the energizing quantities for drop-out shall be stated by the manufacturer.

b) Polarities

Where polarities are not marked on the terminals of the input circuit and/or contact circuits, the tests shall be made under the most severe conditions of polarity.