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Electrical relays - Part 15: Endurance tests for electrical relay contacts - Specification for the characteristics of test equipment

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Relais électriques. Quinzičme partie: Essais d'endurance des contacts des relais électriques - Spécification pour les caractéristiques des équipements d'essai

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Electrical relays

Part 15: Endurance tests for electrical relay contacts — Specification for the characteristics of test equipment

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL RELAYS

Part 15: Endurance tests for electrical relay contacts — Specification for the characteristics of test equipment

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by IEC Technical Committee No. 41: Electrical Relays.

At the meeting held in Nice in 1976, it was decided to study the characteristics of test equipment for endurance tests for electrical relay contacts.

A draft was discussed at the meeting in Milan and was circulated under the Accelerated Procedure in May 1979. The draft, Document 41(Central Office)28, was submitted to the National Committees for approval under the Six Months' Rule in November 1979.

The National Committees of the following countries voted explicitly in favour of publication:

Australia	Poland
Belgium	South Africa (Republic of)
Brazil	Sweden
France	Switzerland
Germany	Turkey
Ireland	United Kingdom
Japan	

The Italian and the United States of America National Committees do not consider that this document contains enough mandatory requirements of significance to justify its publication as an IEC standard.

Technical Committee No. 41 has decided to classify its publications on a hierarchical basis:

First level: General standards.
Second level: Generic standards relating wholly or partly to a family of relays.
Third level: Standards applicable wholly or partly to a particular group of relays.
Fourth level: Particular requirements or specifications relating to a specific type (or pattern) of relay.

This standard is a first level specification.

Other IEC publications quoted in this standard:

Publications Nos. 50(446): International Electrotechnical Vocabulary (I.E.V.), Chapter 446: Electrical Relays.
255-0-20: Electrical Relays — Contact Performance of Electrical Relays.
255-1-00: All-or-nothing Electrical Relays.
255-14: Part 14: Endurance Tests for Electrical Relay Contacts — Preferred Values for Contact Loads.

ELECTRICAL RELAYS

Part 15: Endurance tests for electrical relay contacts — Specification for the characteristics of test equipment

1. General

1.1 *Scope*

This standard specifies the main characteristics of endurance test equipment used for electrical relay contacts used in relays specified in the IEC 255 series of publications.

1.2 *Functional block diagram*

The functions of a complete endurance test equipment are shown in the following block diagram:

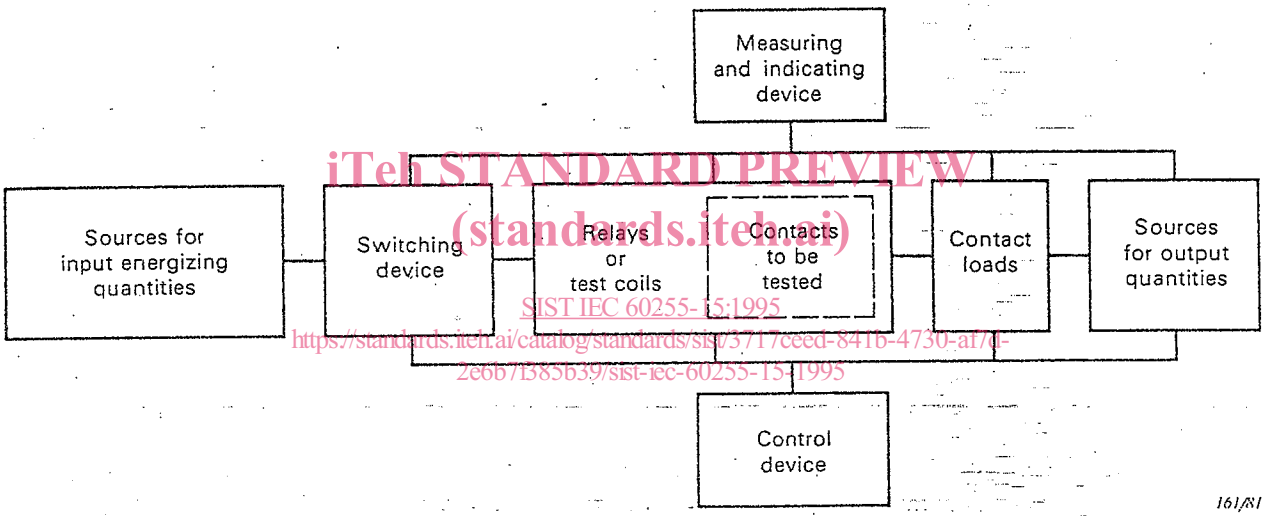

FIG. 1. — Functional block diagram of a complete endurance test equipment.

2. Terms and definitions

In addition to the general terms defined in IEC Publication 50(446): International Electrotechnical Vocabulary (I.E.V.), Chapter 446: Electrical Relays, and in other parts of IEC Publication 255, the following terms and definitions apply:

2.1 *Sources for input energizing quantities*

The power supplies including provision for stabilization within given voltage limits and given impedances including safety arrangements, e.g. fuses, etc., for the input energization of relays.

2.2 *Switching device*

An apparatus to effect the various switching actions required during a cycle of testing, including the connections to relays to be tested, decoupling devices (e.g. diodes), and current

indicators placed in the relay coil circuits; and having the ability to change the polarity of the connections to bi-stable relays.

2.3 *Sources for output quantities*

The power supplies including provision for stabilization within given voltage and impedance limits including safety arrangements, e.g. fuses, etc., to energize the loads.

2.4 *Control device*

The equipment generating commands to run a specified test sequence controlling synchronization and the flow of orders (e.g. starts, measurements, stops).

2.5 *Measuring and indicating device*

A facility for indicating and detecting failures and for measuring and possibly recording the results of a test.

Note. — This may cover:

- sample specification;
- date of test;
- number of operations or test time;
- type and number of failures, possibly stop signals to switching device;
- number of operations until failure;
- limits, mean values etc., of measurements and tests;
- failures of test equipment;

The detail specification may prescribe that the information recorded be made indifferently by counters, tape, etc.

3. Equipment application range

The test equipment shall be suitable for use with one or more of the preferred contact loads specified in Sections Two and Three of IEC Publication 255-14: Part 14: Endurance Tests for Electrical Relay Contacts — Preferred Values for Contact Loads.

4. Environmental conditions

The test equipment shall be able to operate in the following ranges of environmental conditions.

Ambient temperature

15 °C to 35 °C.

Atmospheric pressure

86 kN/m² to 106 kN/m².

Relative humidity

45% to 75%.

Note. — In practice the switching device (Sub-clause 2.2) and control device (Sub-clause 2.4) may be combined into a single piece of equipment, e.g. switching programmer.

5. Requirements for input circuits

5.1 *Sources for input energizing quantities and switching device*

Sources for input energizing quantities shall be capable of delivering the rated values of energizing quantities, the tolerances for which shall be as stated in the blank detail specification. The switching device shall be capable of handling the rated values of the energizing quantities without affecting the stated tolerances.

5.1.1 The rated voltages shall be chosen from the values given in Sub-clause 3.1.1 of IEC Publication 255-1-00: All-or-nothing Electrical Relays.

The source, and when necessary, its polarity shall be able to be controlled externally.

5.1.2 The number of cycles per hour shall be chosen from the values given in Sub-clause 3.5.1 of IEC Publication 255-1-00.

5.1.3 The input voltage envelope shall be rectangular (practically bounce-free) and the duty factor 50% unless otherwise specified by the detail specification for the contact under test.

5.2 *Connection of relays and test coils*

When several coils are energized together a parallel connection is preferred. Decoupling devices (e.g. diodes) should be provided if necessary.

However, where coils are intended to be operated at a relatively high current and low voltage, several coils may be energized in series together with a suitable value of resistance, if necessary.

6. Requirements for output circuits

6.1 *Sources for output quantities*

The source voltage shall be chosen from the rated voltage values given in Clause 3 of IEC Publication 255-0-20: Electrical Relays — Contact Performance of Electrical Relays.

The requirements for source impedance and resistance, together with the tolerance of the source voltage shall be in accordance with Sub-clause 1.2.2 of IEC Publication 255-14.

6.2 *Connections between resistive loads and contacts*

For resistive loads or loads containing resistive components for application categories 0 and 1, the capacitance across the resistance including the wiring shall be less than 50 pF.

7. Measuring and indicating device requirements

7.1 *Intervals of indications*

The failures which are to be registered by the indicating device shall be selected from Sub-clause 4.4 of IEC Publication 255-0-20 and given in the detail specification.

Where accumulated failures are to be indicated at intervals, the appropriate quantities shall be tested at the end of the following preferred number of operations:

0; $1 \cdot 10^n$; $3 \cdot 10^n$; n = 3, 4, 5, 6, 7, 8, ... and end of life.

For some types of failure the indicating device may be capable of registering failures after each operation.

The equipment may be provided with automatic interruption of the input and output circuits when a failure of a particular type occurs.

7.2 *Minimum interruption time*

Interruptions (bounces, etc.) lasting for a shorter time than the value specified in the detail specification should not be taken into account (e.g. neither indicated nor recorded), for instance, 10 µs for categories 0 and 1, or 1 ms for categories 2 and 3.

8. Control device

8.1 *Waveforms*

The waveform showing the energization of the relay under test, its connection to the measurement circuits and the periods of failure checking should be as shown in Figure 2.

For a. c. relays, the test cycle should not be in synchronism with the supply frequency unless it can be shown that this does not lead to misleading test results.

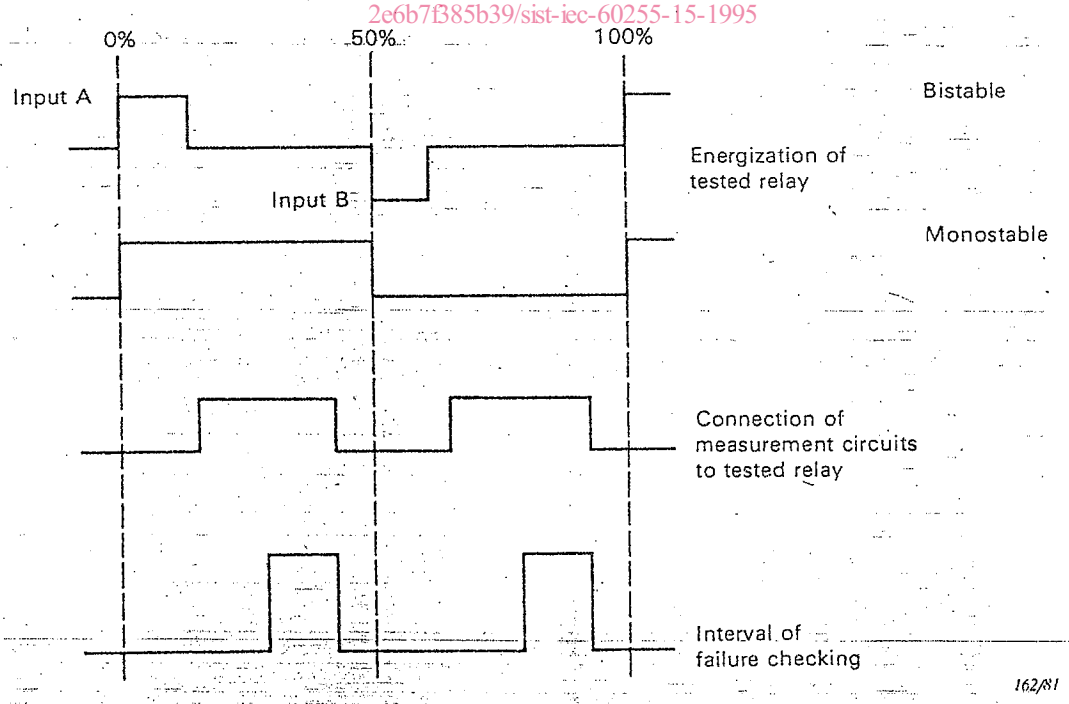

FIGURE 2