IEC 63522-6

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electrical relays – Tests and measurements –
Part 6: Contact-circuit resistance or voltage drop

Relais électriques – Essais et mesurages –
Partie 6: Résistance (ou chute de tension) du circuit de contact

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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ELECTRICAL RELAYS – TESTS AND MEASUREMENTS –

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FOREWORD

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IEC 63522-6 has been prepared by IEC technical committee 94: Electrical relays. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
94/1077/FDIS	94/1118/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of IEC 63522 series, published under the general title *Electrical relays – Tests and measurements*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

ELECTRICAL RELAYS – TESTS AND MEASUREMENTS –

Part 6: Contact-circuit resistance or voltage drop

1 Scope

This part of IEC 63522 is used for testing all kinds of electrical relays and for evaluating their ability to perform under expected conditions of transportation, storage and all aspects of operational use.

NOTE Examples for electrical relays in the sense of this document include electromechanical relays, reed relays, reed contacts, reed switches, solid-state relays, time relays and technology combinations of these.

This document defines a standard test method to measure contact-circuit resistance or voltage drop.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 63522-0, *Electrical relays – Tests and measurements – Part 0: General and guidance*[1]

3 Terms and definitions

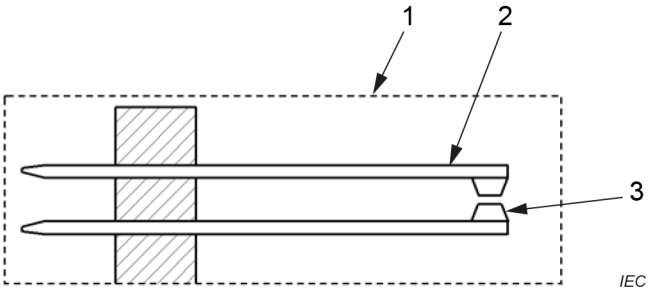
For the purposes of this document, the terms and definitions given in IEC 63522-0 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
contact-circuit
output circuit containing contact members (see Figure 1)

1 Under preparation. Stage at the time of publication: IEC CDV 63522-0:2024.



Key

1 Contact-circuit

2 Contact member

3 Contact point

Figure 1 – Example of a contact-circuit

4 Test procedure

4.1 Elementary relays

4.1.1 Purpose

The contact-circuit resistance (or voltage drop) test is to check that the resistance (or voltage drop) across a closed contact remains within specified limits.

4.1.2 Procedure

4.1.2.1 Measurement details

The resistance (or voltage drop) shall be measured using a four-terminal bridge, by the voltmeter-ammeter method, or, particularly for dynamic tests, using automatic monitoring equipment.

The contact-circuit resistance shall be measured with AC voltage or DC voltage. AC voltage is preferred, unless otherwise specified.

For AC measurements, the frequency shall be 0,8 kHz to 2 kHz, unless otherwise prescribed.

For DC measurements, the resistance shall be measured with forward and reverse current, except for the following situations:

a) dynamic testing;

b) measurement in one direction current is permitted, provided they show equivalent test results;

c) If the load side with polarity, the resistance is measured according to the specified polarity without changing the polarity.

The type of measurement shall be as required, and be selected from the following:

– static contact-circuit resistance measurement denotes that, for each measurement, the contacts remain closed for an interval sufficient to allow all transients to decay. Three test cycles shall be made;

– dynamic contact-circuit resistance measurement denotes that the relay coil is energized by a square wave, the frequency being as required. A specified number of cycles shall be made, and each of the cycles shall be monitored. Monitoring shall start after the contact has reached stable closed condition, or after at least 30 % of the closed part of each cycle has elapsed, whichever is later. Any irregularity[2] in contact-circuit resistance not exceeding a duration of 10 µs shall be ignored, unless another value is required by the manufacturer, for example 100 µs.

The contact shall not be operated while the measuring voltage is applied, unless otherwise explicitly stated by the manufacturer. The voltage shall be applied after the contacts are closed, and removed before the contacts are opened.

Where the connection points specified in the detail specification are not directly accessible, the resistance of the cable or wire used shall be subtracted from the measured value. The corrected value shall be recorded.

The coil shall be energized at the rated voltage, unless otherwise specified.

There shall be no preconditioning cycle prior to the measurement, unless otherwise explicitly stated by the manufacturer.

During the measurement, any abnormal pressure on the contacts under test and movement of the test cables shall be avoided.

NOTE During an endurance test, checking of contact-circuit resistance is carried out by another method, for example by checking the voltage drop across the tested contact with the load current flowing through the contact, or any other technical equivalent measurement.

4.1.2.2 Test current and voltage

In order to get the value closer to the actual application, the test current and voltage should correspond to the actual load conditions.

If the on-line test cannot apply the actual load conditions, the test current and voltage should be selected according to Table 1 depending on the rated contact current.

Table 1 – Test current and voltage

Rated contact current A	Maximum test current A	Maximum test voltage V
<0,01	0,001	0,03
≥0,01~<0,1	0,01	0,03
≥0,1~<1	0,1	10
≥1~<30	1	30
≥30	20	30

[2] The non-repetitive transient value considered as irregularity.

4.1.2.3 Measuring cycles

4.1.2.3.1 Measurement with direct current (DC)

One measuring cycle consists of:

a) application of the coil voltage;
b) measurement with current flowing in one direction;
c) measurement with current flowing in the opposite direction (not applicable for measurement in one direction current according to 4.1.2.1);
d) disconnection of the coil voltage.

4.1.2.3.2 Measurement with alternating current (AC)

One measuring cycle consists of:

a) application of the coil voltage;
b) making the measurement;
c) disconnection of the coil voltage.

NOTE Unless otherwise specified, the contact(s) made are not disturbed between the end of the preceding test and the application of the voltage in this test.

4.1.3 Conditions to be specified

The conditions to be specified are the following:

a) type of measurement (with DC or AC voltage);
b) frequency of the test voltage, if other than 0,8 kHz to 2 kHz (only in case of measurement with AC voltage);
c) type of measurement: steady-state or dynamic operation;
d) for dynamic tests, the frequency of the square wave, the number of cycles, and the rated measurement time;
e) coil voltage value, if other than rated value;
f) points of measurement;
g) test contact current;
h) test contact voltage;
i) the number of values for measurement shall be specified in the detailed specification;
j) evaluation in case of multiple values;
k) maximum contact-circuit resistance.

4.2 Reed switches

4.2.1 Purpose

The contact-circuit resistance shall not exceed the value prescribed in the detail specification.

4.2.2 Procedure

The contact-circuit resistance shall be measured by the 4-point (Kelvin) method at a point 6 mm from the point of emergence of the termination from the seal, or as required in the detail specification.

The voltage and current applied to the contact-circuit shall not exceed 6 V and 1 A AC RMS or DC unless otherwise required in the detail specification.

The frequency of the alternating current shall be in the audio frequency range.

The switch shall be saturated magnetically unless otherwise required and the test coil energization reduced to a value required in the detail specification.

The break-contact-circuit resistance shall be measured without energization of the test coil unless otherwise specified.

The measurement circuit can be connected to the switch at instants 0 or t_2 (see Figure 2) as required in the detail specification.

The measurement circuit shall be disconnected from the switch at the instant t_3 as required in the detail specification.

The measurement of the contact-circuit resistance shall be made between instant t_2 and t_3 for the make contact and between t_5 and t_6 for the break contact, see Figure 3.