

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Electrical relays – Tests and measurements –  
Part 12: Internal moisture**

**Relais électriques – Essais et mesurages –  
Partie 12: Humidité interne**

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

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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**ELECTRICAL RELAYS – TESTS AND MEASUREMENTS –****Part 12: Internal moisture**

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IEC 63522-12 has been prepared by subcommittee 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
94/1050/FDIS	94/1108/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

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

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# ELECTRICAL RELAYS – TESTS AND MEASUREMENTS –

## Part 12: Internal moisture

### 1 Scope

This document is used for testing electromechanical elementary relays (electromechanical relays, reed relays, reed contacts, reed switches and technology combinations of these) and evaluates their ability to perform under expected conditions of transportation, storage, and all aspects of operational use.

This document defines a standard test method to provoke internal moisture inside relays by different methods. The device under test (DUT) is tested at its specified energization values throughout the defined temperature range.

The test methods in this document are applicable to RT III, RT IV and RT V products only, i.e., wash-tight, sealed, and hermetically sealed DUTs.

### 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:—<sup>1</sup>, *Electrical relays – Tests and measurements – Part 0: Testing – General and guidance*

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IEC 63522-1, *Electrical relays – Tests and measurements – Part 1: Visual inspection and check of dimensions*<sup>2</sup>

IEC 63522-5, *Electrical relays – Tests and measurements – Part 5: Insulation resistance*<sup>3</sup>

IEC 63522-6, *Electrical relays – Tests and measurements – Part 6: Contact-circuit resistance (or voltage drop)*

IEC 63522-7, *Electrical relays – Tests and measurements – Part 7: Functional tests*

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<sup>1</sup> First edition under preparation. Stage at the time of publication: IEC CDV 63522-0:2024.

<sup>2</sup> First edition under preparation. Stage at the time of publication: IEC FDIS 63522-1:2024.

<sup>3</sup> First edition under preparation. Stage at the time of publication: IEC FDIS 63522-5:2024.

### 3 Terms and definitions

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

### 4 Test procedure

#### 4.1 Purpose

The purpose of this test procedure is to determine whether internal moisture has an adverse effect on certain properties of the DUT, and that it can perform as required at its specified energization values throughout the defined temperature range.

NOTE The test methods defined in this document will not yield comparable results due to the different sources of heat.

#### 4.2 Procedure

##### 4.2.1 General

The tests stated in this document shall be carried out with appropriate test conditions and severities, as well as suitable measurement conditions.

The DUT shall be in a new and clean condition, mounted as in service or mounted as specified by the manufacturer. Unless otherwise stated in this document, the test shall be performed under applicable reference conditions given in IEC 63522-0:—<sup>4</sup>, 4.4.

A minimum of five DUTs shall be tested, the preferred number of DUTs being 10.

Internal moisture can create statistical effects due to the variety of possible moisture distribution patterns. Therefore, a number of DUTs greater than 5 is recommended.

##### 4.2.2 Method 1: External temperature impact

The DUT coil shall be energized as specified in 4.3 c) while the DUT is under its maximum rated operating temperature for 1 h, and then under the minimum rated operating temperature for an additional 1 h. Unless otherwise specified, the temperature change shall occur at a rate of  $(5 \pm 1)$  K/min.

During the test procedure, measure and monitor the insulation resistance between all contacts and the DUT enclosure at 20 min intervals in accordance with IEC 63522-5.

At the end of the low temperature exposure, the coil shall be de-energized, or, for bistable DUTs, the rated reset voltage shall be momentarily applied. The corresponding function of the DUT shall be monitored and a final insulation resistance measurement between all contacts and the DUT enclosure shall be carried out in accordance with IEC 63522-5.

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<sup>4</sup> First edition under preparation. Stage at the time of publication: IEC CDV 63522-0:2024.



The function may be monitored via the contact state according to IEC 63522-0 or other suitable measurements on the terminals or coils.

NOTE Other preferred values for temperature change rates are given in IEC 60068-2-14.

#### 4.2.3 Method 2: Over-energization at room temperature

The DUT coil shall be energized at room temperature at 140 % of its rated energization value for 2,5 min. Measure and monitor the insulation resistance between all contacts and the DUT enclosure at 30 s intervals in accordance with IEC 63522-5. The maximum coil heating due to the allowed duty cycle shall be considered.

### 4.3 Conditions

The conditions to be specified are the following:

- a) method 1 or 2, or both, in accordance with 4.2.2 or 4.2.3, respectively. If both methods are specified to be carried out, the methods shall not be carried out on the same DUT. Each method shall be considered as an independent test on a new set of DUTs in accordance with 4.2.1;
- b) number of DUTs used for the test (new DUTs to be used for method 1 and method 2);
- c) rated energization quantity (if not specified differently);
- d) for method 1 only: maximum and minimum rated operating temperature, temperature change rate, monitoring procedure, functional testing parameters as specified in IEC 63522-7;
- e) for methods 1 and 2: test conditions, measurement setup, measurement time and limit value of insulation resistance, as required by IEC 63522-5. Unless otherwise specified, recommended values are:
  - measurement time: 60 s for method 1 and 5 s for method 2;
  - insulation resistance:  $\geq 1 \text{ M}\Omega$  for basic insulation,  $\geq 2 \text{ M}\Omega$  for reinforced insulation.

## 5 Evaluation

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### 5.1 General

#### 5.1.1 Method 1: External temperature impact

After the test, the DUTs shall be in good condition, and it shall be verified that the contact(s) has (have) changed their state. Neither any of the insulation resistance readings during the 20 min intervals, nor the final insulation resistance reading shall be lower than the value as specified in 4.3 e). All those insulation resistance data shall be measured in accordance with IEC 63522-5.

The following tests shall be carried out at room temperature within 30 min after the test procedure:

- a) visual inspection as specified in IEC 63522-1. The DUTs shall not show any signs of damage or corrosion. Dimensional checks are not required.
- b) functional test as specified in IEC 63522-7. The DUTs shall respond to each functional test step with its intended contact state for each defined voltage step.
- c) insulation resistance measurement between all contacts and the DUT shall be done in accordance with IEC 63522-5 with measurement time of 60 s.

In addition, the measurement of the contact resistance in accordance with IEC 63522-6 before and after the test may give indications as to the internal moisture content due to condensation. However, as the condensation distribution is not known, the measurement shall be done on a larger number of samples, preferably at least 10 pieces, to achieve statistical evidence. If such an evaluation is carried out, the DUT terminals shall be powered with low current load to avoid self-heating, refer to IEC 63522-6 for maximum values for the applicable contact load category.

### 5.1.2 Method 2: Over-energization at room temperature

None of the insulation resistance readings during the 30 s intervals shall be lower than the value specified as per 4.3 e). All those insulation resistance data shall be measured in accordance with IEC 63522-5.

## 5.2 Test report

If this document is executed as a part of a test record of another standard, then the results shall be reported as required in the other standard.

Otherwise, it is recommended to issue a dedicated test report according to this document.

The test report shall contain all the information necessary to reproduce the test. In particular, the following shall be recorded.

The test report shall include at least the following:

- Number of DUTs under test, numbered individually;
- Method used according to 4.2;
- Conditions used according to 4.3;
- Evaluation of each of the DUTs individually, as defined under 5.1 or 5.1.2, respectively;
- Test method/setup (only if several setups possible);
- If applicable, any other observations.

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