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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Electrical relays – Tests and measurements – Part 8: Timing

Relais électriques – Essais et mesurages – Partie 8: Contrôle des temps

IEC 63522-8:2024

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Electrical relays – Tests and measurements – 1005 Part 8: Timing

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# ELECTRICAL RELAYS – TESTS AND MEASUREMENTS –

# Part 8: Timing

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

Draft	Report on voting
94/1036/FDIS	94/1078/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.

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# ELECTRICAL RELAYS – TESTS AND MEASUREMENTS –

# Part 8: Timing

#### 1 Scope

This part of IEC 63522, when required by the detail specification, is used for testing all kinds of relays. This test can also be used for similar devices when specified in a detail specification.

This document defines a standard test method to ensure that the relay times are within the specified limits.

### 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: Testing – General and guidance<sup>1</sup>

# 3 Terms and definitions ocument Preview

#### 3.1 General

#### IEC 63522-8:2024

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

#### 3.2 Terms and definitions related to electromechanical elementary relays

#### 3.2.1 operate time set time

time interval between the application of the specified input voltage to a relay in the release/reset condition and the change of state of the last output circuit, bounce time not included

[SOURCE: IEC 60050-444:2002, 444-05-01, modified – The term "set time" has been added, the domain "(for elementary relays)" and figure have been omitted, and the term "reset" has been added to the definition.]

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

# 3.2.2

#### release time

time interval between the removal of the specified input voltage from a monostable relay in the operate condition and the change of state of the last output circuit, bounce time not included

[SOURCE: IEC 60050-444:2002, 444-05-02, modified – The domain "(for elementary relays)" and figure have been omitted.]

#### 3.2.3

#### reset time

time interval between the application of the specified input voltage to a bistable relay in the operate condition and the change of state of the last output circuit, bounce time not included

[SOURCE: IEC 60050-444:2002, 444-05-03, modified – The domain "(for elementary relays)" and figure have been omitted.]

#### 3.2.4

#### bounce time

for a contact which is closing/opening its circuit, time interval between the instant when the contact circuit first closes/opens and the instant when the circuit is finally closed/opened

[SOURCE: IEC 60050-444:2002, 444-05-04, modified - Figure 1 has been omitted.]

## 3.2.5

#### bridging time

# iTeh Standards

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

[SOURCE: IEC 60050-444:2002, 444-05-05] TPreview

#### 3.2.6 transfer time

#### IEC 63522-8:2024

for a change-over break-before-make contact, time interval during which both contact circuits 2024 are open

[SOURCE: IEC 60050-444:2002, 444-05-06]

## 3.2.7

#### stabilization time

time interval between the instant when a specified input voltage is applied to an electromechanical relay and the instant when the last output circuit is closed/opened and fulfils the specified requirements, bounce time included

[SOURCE: IEC 60050-444:2002, 444-05-07, modified – The domain "(for elementary relays)" has been omitted.]

#### 3.2.8

#### minimum time of energization

<for operation> minimum duration of the input voltage to ensure that the relay operates or resets

[SOURCE: IEC 60050-444:2002, 444-05-08]

## 3.2.9

#### contact time difference

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

### 3.3 Terms and definitions related to time relays

#### 3.3.1

# specified time

specified characteristic of the time relay at given type of function, for example operate time, release time, pulse on time, interval time

[SOURCE: IEC 61812-1:2023, 3.1.3]

#### 3.3.2

#### effect of influence

#### effect of influence on specified time

degree with which the influence quantity within its nominal range has an effect on the specified time

[SOURCE: IEC 60050-445:2010, 445-06-02, modified – The term "effect on influence" has been added.]

#### 3.3.3

#### setting accuracy

difference between the measured value of the specified time and the reference value set on the scale

Note 1 to entry: For analogue setting the setting accuracy value relates to the maximum setting value.

[SOURCE: IEC 60050-445:2010, 445-06-07]

# 3.3.4

#### repeatability

difference between the upper and lower limits of the specified confidence range determined from several time measurements of a time relay under identical conditions

Note 1 to entry: Preferably the repeatability is indicated as a percentage of the mean value of all measured values. [SOURCE: IEC 60050-445:2010, 445-06-08]

# 3.3.5

## recovery time

minimum time interval for which the power supply is removed or control signal is applied or removed before the specified function can be performed again

[SOURCE: IEC 60050-445:2010, 445-06-04, modified – In the definition, the verbal form "must be" is replaced with "is".]

#### 3.3.6

#### minimum control impulse time

shortest duration of the power supply or control signal to fulfil the specified function

[SOURCE: IEC 60050-445:2010, 445-06-02]

# 4 Test procedure

#### 4.1 Timing tests for elementary relays

### 4.1.1 Purpose

These tests are applicable to all elementary relays, in order to ensure that the relay times are within the specified limits. These tests can be used:

- 1) for statistical evaluation of the behavior of a type of relay;
- 2) for confirmation of the specification of a single relay or when the application requires time within fixed limits.

#### 4.1.2 Procedure

#### 4.1.2.1 General

For the energization of the coil, the output impedance of the source shall be chosen to ensure that the maximum voltage drop and the setting time do not exceed the values specified in the product specification.

The switch for switching the coil shall be bounce-free.

For AC coil relays, a synchronous switching device, variable in point on wave, shall be used. The trigger delay angle of the sinewave shall be set either to obtain the maximum time interval, or to the specified points on wave, as specified in the product specification. As an alternative, when only a reference value is needed, a DC energization of the coil with a value that causes equivalent power or ampere turns of the coil may be used.

The contact load shall be resistive, the switching voltage shall be as specified in the product specification, the switching current shall be 1 mA for CC0, 10 mA for CC1, 100 mA for CC2, unless otherwise specified in the product specification.

#### IEC 63522-8:2024

time, a suitable circuit is given in Figure 1, and typical traces on the oscilloscope screen are shown in Figure 2. Other equivalent measuring methods are also allowed.

Before starting the test, the samples to be measured shall be preconditioned in the measurement room for a period of at least 2 h.

## 4.1.2.2 Statistical evaluation of a relay type

A minimum of 5 relays of equivalent construction will be measured in order to get a general estimation; more precise values should be derived from a statistical analysis on a larger number of samples.

All the (minimum) 5 relays will be measured, and on each relay at least 5 consecutive measurements will be performed and recorded, leaving time enough for coil cooling after any energization.

For defining the nominal value of each time, all the values (minimum  $5 \times 5 = 25$ ) will be considered; the average and the standard deviation of all the values will be calculated.

#### 4.1.2.3 Single relay or single event measurement

In such cases, a single relay will of course be measured.

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### 4.1.3 Conditions

The conditions to be specified are the following:

- a) mounting position of the relay;
- b) coil voltage value, cycling rate and duty factor of the energization. Preferably, the lower limit of the operative range should be used for testing the operate time, and the upper limit for testing the release time; in the case of bistable relays, set and reset values shall be specified;
- c) means for the disconnection for release time measurement, if of importance. Short-circuiting the relay coil while protecting the power supply source from overload may be specified as an alternative;
- d) maximum voltage drop and setting time of the source;
- e) contact category, switching voltage and switching current;
- f) times to be measured, their limits and contact sequencing;
- g) for AC coil relays, the trigger delay angle of the sinewave (e.g. 0°, 45°, 90°, etc.);
- h) contact(s) to be checked;
- i) discontinuities to be ignored if limit is other than 10 µs;
- j) suppression components on coil or contact, if required;
- k) number of relays tested.



#### Components

- C coil of the DUT
- c contact of the DUT
- U energization supply
- S switch, bounce-free
- B battery
- $R_1$  to  $R_4$  resistors
- OSC oscilloscope
- Sync trigger input
- Y vertical deflection input

NOTE In order to distinguish between bridging and transfer time, the following ratios can be used for the resistors:  $R_1 = 1$ ,  $R_2 = 2$ ,  $R_3 = 2/3$ ,  $R_4 = 1$ .

Figure 1 – Typical circuit for the measurement of time parameters