

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Measuring relays and protection equipment –  
Part 11: Voltage dips, short interruptions, variations and ripple on auxiliary  
power supply port**

**Relais de mesure et dispositifs de protection –  
Partie 11: Creux de tension, coupures brèves, variations et ondulation sur  
l'accès alimentation auxiliaire**



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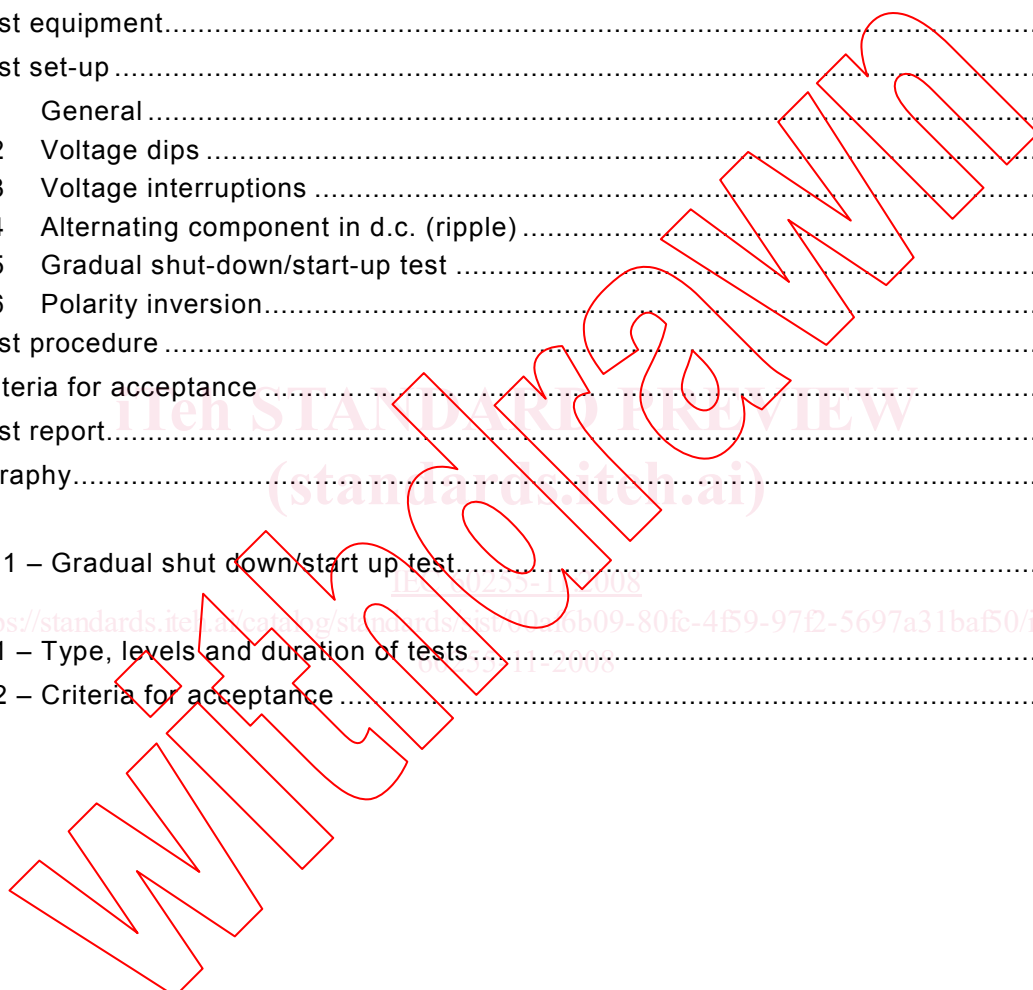


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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MEASURING RELAYS AND PROTECTION EQUIPMENT –****Part 11: Voltage dips, short interruptions, variations  
and ripple on auxiliary power supply port**

## FOREWORD

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International Standard IEC 60255-11 has been prepared by IEC technical committee 95: Measuring relays and protection equipment.

This second edition cancels and replaces the first edition published in 1979. This edition constitutes a technical revision. The main differences with respect to the previous edition concern:

- addition of voltage dips and interruptions test in a.c.;
- addition of gradual shut-down/start-up test;
- addition of reversal of d.c. power supply polarity test.

The text of this standard is based on the following documents:

FDIS	Report on voting
95/239/FDIS	95/244/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of IEC 60255 series, published under the general title *Measuring relays and protection equipment*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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## MEASURING RELAYS AND PROTECTION EQUIPMENT –

### Part 11: Voltage dips, short interruptions, variations and ripple on auxiliary power supply port

#### 1 Scope and object

This part of the IEC 60255 series specifies the general requirements for a.c. and d.c. power supplies, for measuring relays and protection equipment for power system protection, including the control, monitoring and process interface equipment used with those systems. This part is based on:

- IEC 61000-4-11 for a.c. voltage dips, short interruptions and variations;
- IEC 61000-4-17 for voltage ripple;
- IEC 61000-4-29 for d.c. voltage dips, short interruptions and variations.

The objective of the tests is to confirm that the equipment under test will operate correctly when energised and subjected to dips, interruptions and alternating components (ripple).

The requirements specified in this standard are applicable to measuring relays and protection equipment in a new condition and all tests specified are type tests only.

The object of this standard is to state:

- definitions of terms used;
- test severity levels;
- test equipment;
- test set-up;
- test procedure;
- criteria for acceptance;
- test report.

#### 2 Normative references

The following referenced documents are indispensable for the application 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 60255-6, *Electrical relays – Part 6: Measuring relays and protection equipment*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-17, *Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on d.c. input power port immunity test*

IEC 61000-4-29, *Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **type test**

conformity test made on one or more items representative of the production

[IEV 151-16-16]

#### 3.2

##### **equipment under test**

##### **EUT**

equipment which may be either a measuring relay or a protection equipment

#### 3.3

##### **auxiliary power supply port**

AC or d.c. auxiliary energising input of the EUT

NOTE Ports connected to voltage transformer (VT) or current transformer (CT) are not covered by this standard.

#### 3.4

##### **alternating component**

##### **$A_c$**

alternating component in d.c. is defined as:

$$A_c = 100 \frac{U_{\max} - U_{\min}}{U_0}, \text{ in \%}$$

where

$U_{\max}$  = maximum instantaneous voltage;

$U_{\min}$  = minimum instantaneous voltage;

$U_0$  = d.c. component.

[IEV 161-02-26, modified]

### 4 Requirements

#### 4.1 Test levels

It is important that the effects of the tests should be assessed at the maximum and minimum values of the voltage according to the product technical documentation.

The voltages in this standard use the rated voltage for the equipment ( $U_T$ ) as a basis for voltage test level specification. Where the equipment has a rated voltage range, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.

EXAMPLE A product with a rated voltage range of 100 V to 200 V  $\pm$  20 % should be tested at 80 V and 240 V.

#### 4.2 Test requirements

Products shall be tested as described in Table 1. For products intended to be powered by d.c. power supply, only the corresponding tests shall be done. For products intended to be powered by a.c. power supply, only the corresponding tests shall be done. For products intended to be powered either by a.c. power supply or by d.c. power supply, both tests shall be done.



Table 1 – Type, levels and duration of tests

Row	Type of phenomena	Test specifications	Units	Basic standards	Criterion for acceptance
1a	Voltage dips (for d.c. power supply)	0	% residual voltage	IEC 61000-4-29	A
		10 to 1000 <sup>b</sup>	ms		
		40 200	% residual voltage ms		
1b	Voltage dips (for a.c. power supply)	70 500	% residual voltage ms	IEC 61000-4-11	C
		0	% residual voltage		
		0,5 to 25 <sup>a</sup>	cycles		
2a	Voltage interruptions (for d.c. power supply)	40	% residual voltage	IEC 61000-4-11	C
		10/12 at 50/60 Hz	cycles		
		70	% residual voltage		
2b	Voltage interruptions (for a.c. power supply)	25/30 at 50/60 Hz	cycles	IEC 61000-4-29	C
		0	% residual voltage		
		5	s		
3	Alternating component in d.c. (ripple) (for d.c. power supply)	0	% residual voltage	IEC 61000-4-11	C
		250/300 at 50/60 Hz	cycles		
4	Gradual shut-down/start-up (for d.c. power supply)	15 % of rated d.c. value	V	IEC 61000-4-17	A
		100/120 at 50/60 Hz <sup>c</sup>	Hz, sinusoidal waveform		
		60	s, shut-down ramp		
5	Reversal of d.c. power supply polarity	5	min, power off	---	C
		60	s, start-up ramp		
5	Reversal of d.c. power supply polarity	1	min	---	C

<sup>a</sup> Manufacturer shall declare the duration among the following values: 0,5 cycle, 1 cycle, 2,5 cycles, 5 cycles, 10 cycles, 25 cycles.

<sup>b</sup> Manufacturer shall declare the duration among the following values: 10 ms, 20 ms, 30 ms, 50 ms, 100 ms, 200 ms, 300 ms, 500 ms or 1 000 ms.

<sup>c</sup> Test shall be done at a frequency of twice the specified power system frequency(ies).

## 5 Test equipment

For a.c. tests, test equipment shall comply with IEC 61000-4-11.

For alternating component in d.c., test equipment shall comply with IEC 61000-4-17. For other d.c. tests, test equipment shall comply with IEC 61000-4-29.

## 6 Test set-up

### 6.1 General

IEC 60255-6 standard applies.

The protection relay shall be in a quiescent state.

Half of the binary inputs and half of the output relays shall be energised.

Communication modules, if any, shall be activated.

### 6.2 Voltage dips

See IEC 61000-4-11 for a.c. dips.

See IEC 61000-4-29 for d.c. dips.

### 6.3 Voltage interruptions

See IEC 61000-4-11 for a.c. interruptions.

See IEC 61000-4-29 for d.c. interruptions.

### 6.4 Alternating component in d.c. (ripple)

See IEC 61000-4-17.

### 6.5 Gradual shut-down/start-up test

Figure 1 below shows how to test products.

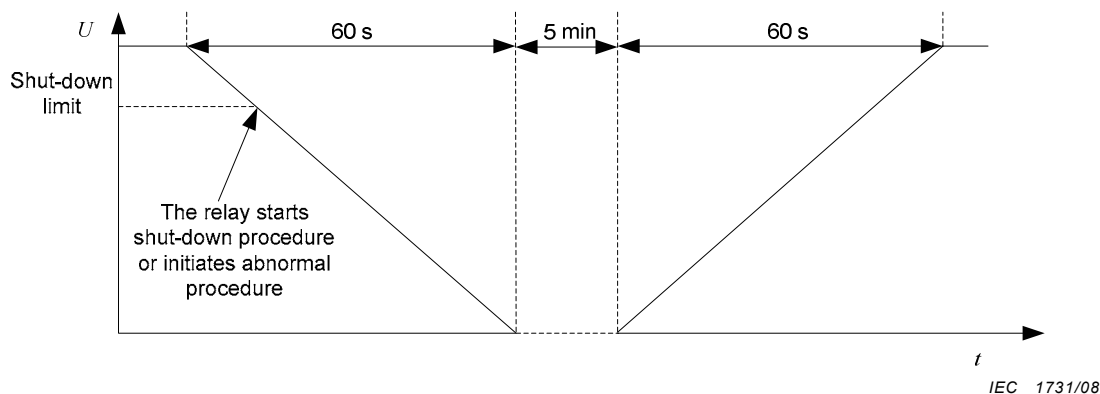


Figure 1 – Gradual shut down/start up test

## 6.6 Polarity inversion

Reverse polarity for power supply inputs shall be applied for 1 min. The results shall be stated and documented by the manufacturer.

## 7 Test procedure

The tests shall be carried out at the reference conditions given in IEC 61000-4-11, IEC 61000-4-17, IEC 61000-4-29 and IEC 60255-6.

## 8 Criteria for acceptance

The criteria for acceptance are given in Table 2.

**Table 2 – Criteria for acceptance**

Criterion	Function	Criterion for acceptance
A	Protection	Normal performance within the specification limits, during and after the test.
	Command and control	Normal performance within the specification limits, during and after the test.
	Measurement	Temporary degradation during test, with self-recovery at the end of the test. No loss of stored data.
	Integral human-machine interface and visual alarms	Temporary degradation or loss of function during test, with self-recovery at the end of the test. No loss of stored data.
	Data communication	Possible bit error rate increase but no loss of transmitted data.
C	Protection	Normal performance within the specification limits, or a predefined behaviour, e.g. temporary loss of function or switch-off, which is clearly specified by the manufacturer until normal operation is automatically resumed. There shall be no unwanted operation.
	Command and control	Normal performance within the specification limits, or a predefined behaviour, e.g. temporary loss of function or switch-off, which is clearly specified by the manufacturer until normal operation is automatically resumed. There shall be no unwanted operation.
	Measurement	Temporary degradation during test, or a predefined behaviour, e.g. temporary loss of function, which is clearly specified by the manufacturer until normal operation is automatically resumed.
	Integral human-machine interface and visual alarms	Temporary degradation during test, or a predefined behaviour, e.g. temporary loss of function or switch-off, which is clearly specified by the manufacturer until normal operation is automatically resumed.
	Data communication	Possible bit error rate increase, or a predefined behaviour, e.g. loss of data, which is clearly specified by the manufacturer until normal operation is automatically resumed.