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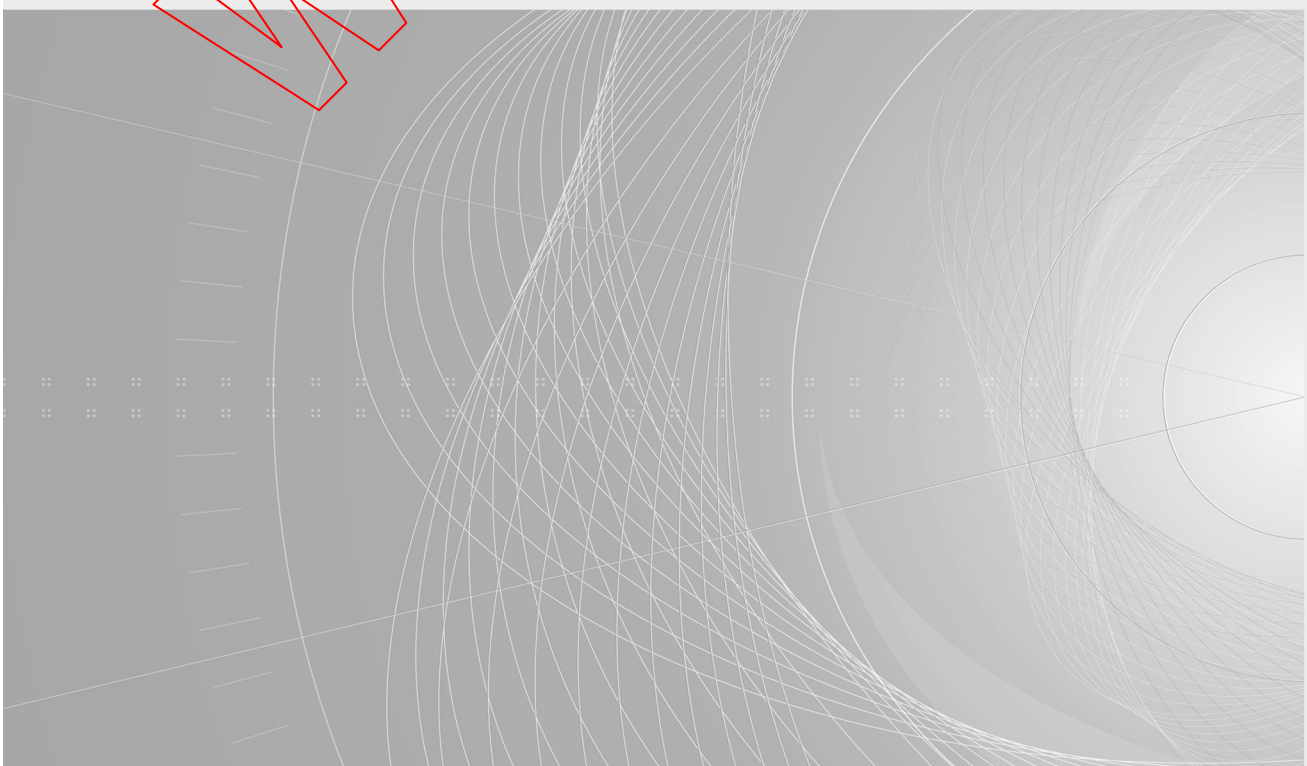
INTERNATIONAL STANDARD

NORME INTERNATIONALE

Measuring relays and protection equipment – Part 22-2: Electrical disturbance tests – Electrostatic discharge tests

Relais de mesure et dispositifs de protection – Partie 22-2: Essais d'influence électrique – Essais de décharge électrostatique



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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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Email: csc@iec.ch
Tél.: +41 22 919 02 11
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MEASURING RELAYS AND PROTECTION EQUIPMENT –

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60255-22-2 has been prepared by IEC technical committee 95: Measuring relays and protection equipment.

This third edition cancels and replaces the second edition published in 1996. It constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- the improvement of the scope and object,
- the improvement of the test severity level, test set-up and test report.

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

FDIS	Report on voting
95/227/FDIS	95/232/RVD

Full information on the voting for the approval of this standard can be found in the voting on report 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

MEASURING RELAYS AND PROTECTION EQUIPMENT –

Part 22-2: Electrical disturbance tests – Electrostatic discharge tests

1 Scope and object

This part of IEC 60255-22 is based on IEC 61000-4-2, referring to that publication where applicable, and specifies the general requirements for electrostatic discharge tests for measuring relays and protection equipment for power system protection, including the control, monitoring and process interface equipment used with those systems.

The object of the tests is to confirm that the equipment being tested will not maloperate when energized and subjected to an electrostatic discharge.

The requirements are applicable only to relays and protection equipment in new condition, and all tests specified are type tests only.

The object of this standard is to state:

- definitions of terms used;
- test severity level;
- test equipment;
- test set-up;
- test procedures;
- criteria for acceptance;
- test report requirements.

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 60050-161, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

IEC 60050-446, *International Electrotechnical Vocabulary – Chapter 446: Electrical relays*

IEC 60050-448, *International Electrotechnical Vocabulary – Chapter 448: Power system protection*

IEC 60255-6:1988, *Electrical relays – Part 6: Measuring relays and protection equipment*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*
Amendment 1 (1998)
Amendment 2 (2000)

3 Terms and definitions

For the purposes of this document, the terms and definitions in IEC 60050-161, IEC 60050-446 and IEC 60050-448 apply and, for special terms, IEC 61000-4-2 applies.

3.1
equipment under test
EUT
equipment which may be either a measuring relay or a protection equipment

3.2
contact discharge method
method of testing, in which the electrode of the test generator is held in contact with the EUT, and the discharge to the EUT actuated by the discharge switch within the generator

3.3
air discharge method
method of testing, in which the charged electrode of the test generator is approached to the EUT, and the discharge actuated by a spark to the EUT

3.4
direct application
application of the test directly to the EUT

3.5
indirect application
application of the test to a coupling plane in the vicinity of the EUT, and simulation of personal discharge to objects which are adjacent to the EUT

3.6
auxiliary equipment
equipment necessary to provide the EUT with the signals required for normal operation, and equipment used to verify the performance of the EUT

4 Test severity level

IEC 61000-4-2 makes reference to two test methods and two methods of application. These are:

- test methods:
  - contact discharge,
  - air discharge;
- applications:
  - direct,
  - indirect.

Tests shall be applied as follows:

- the contact discharge method is the preferred method;
- the air discharge method shall only be used when the accessible surfaces of the EUT are non-conducting;
- the direct application test method shall be used;
- the indirect method of application is not applicable when the EUT is intended to be mounted in a grounded cabinet.

To cover different environmental conditions, this standard includes different severity classes.

General guidance for the selection of severity classes is given in Annex A.

The test severity class shall be chosen from the following table. In this standard, the severity is expressed as the charging voltage of the energy storing capacitor in the discharge generator.

Table 1 – Test severity classes

Class	Test voltage (±5 %)	
	Contact discharge	Air discharge
0	–	–
1	2 kV	2 kV
2	4 kV	4 kV
3	6 kV	8 kV
4	8 kV	15 kV

Class 3 is the normal test severity class for measuring relays and protection equipment.

Testing shall also be satisfied at the lower levels given in Table 1.

NOTE 1 For situations involving a very severe electrostatic environment, testing with higher voltage levels than those specified in Class 4 is subject to agreement between the user and manufacturer, or as defined by the manufacturer. If higher voltages than those shown are specified, special test equipment may be required.

NOTE 2 For Classes 3 and 4, the test voltage levels for the contact discharge method are less than those for the air discharge method, due to the characteristics of the two test methods. It is not intended to imply that the test severity is equivalent between test methods.

5 Test equipment

The recommended test equipment is described in IEC 61000-4-2.

6 Test set-up

The test set-up consists of the test generator, the EUT, and auxiliary instrumentation necessary to perform direct discharges to the EUT, as applicable, in the following manner:

a) contact discharge to conductive surfaces;

b) air discharge at insulating surfaces.

All tests shall be conducted in a test laboratory under the environmental reference conditions outlined in Clause 7.

The EUT shall be tested in as close to installed conditions as possible. Wiring shall be consistent with the manufacturer's recommended procedures, and the EUT shall be tested in its case or housing. All parts intended to be earthed shall be connected to the ground reference plane with copper straps (or copper braid) of at least 20 mm width.

A ground reference plane shall be provided on the floor of the laboratory or on the work bench. It shall be a metallic sheet (copper or aluminium) of 0,25 mm minimum thickness; other metallic materials may be used, but they shall be of at least 0,65 mm thickness. The minimum size of the reference plane is 1 m^2, the exact size depending on the dimensions of the EUT. It shall project beyond the EUT, or the coupling plane, by at least 0,5 m on all sides,

and shall be connected to the protective ground system. Local safety regulations shall always be met.

The EUT shall be placed on the ground reference plane, but distanced from it by means of at least 0,1 m thick insulation supports. The distance to walls and metallic structures shall be at least 1 m.

Cables interconnecting the various parts of the EUT shall be kept at a distance of at least 0,1 m from the ground plane.

The discharge generator shall be earthed via its discharge return cable directly to the ground reference plane, close to the EUT. The total length of this cable is in general 2 m.

Where coupling planes are specified, for example to allow indirect application of the discharge, they shall be constructed from the same material type and thickness as that of the ground reference plane, and shall be connected to the ground reference plane via a cable with a 470 kΩ resistor located at each end. These resistors shall be capable of withstanding the discharge voltage and shall be insulated to avoid short circuits to the ground reference plane when the cable lies on the ground reference plane. An example of a test set-up is given in IEC 61000-4-2.

If monitoring equipment is required, it should be decoupled in order to reduce the possibility of erroneous failure indication.

An example of a test set-up is given in Figure 1.

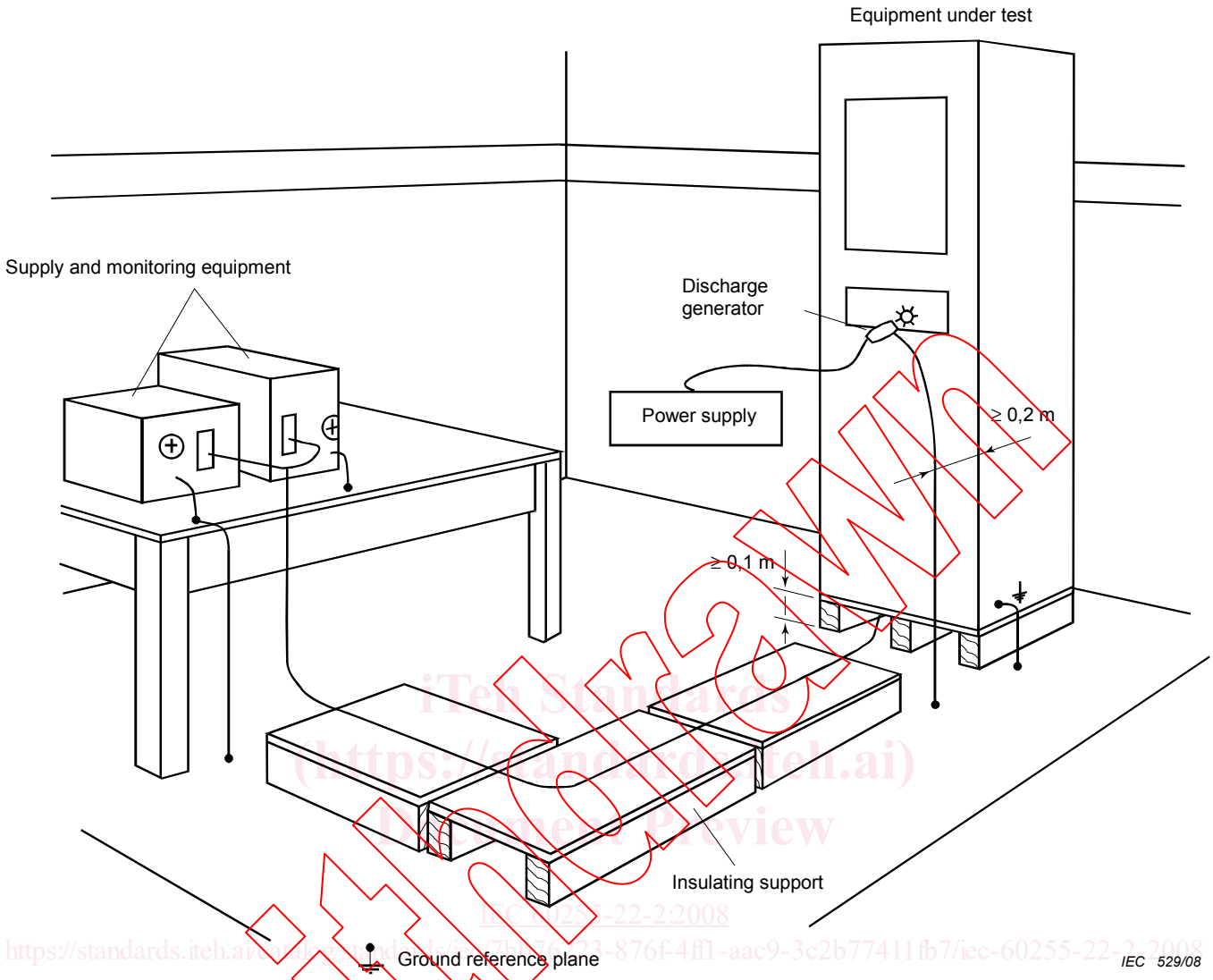

Figure 1 – Example of test set-up with EUT

7 Test procedures

The tests shall be carried out with the equipment under reference conditions, as stated in the applicable clauses of IEC 60255-6.

The tests shall be carried out with auxiliary energizing quantities and loading applied to the appropriate circuits, having values equal to rated conditions (see Note 1 below).

The value of the input energizing quantity shall be as close as possible to the transitional state, but not closer than the claimed variation due to electrostatic discharge disturbance.

The settings and appropriate variations associated with the tests shall be declared by the manufacturer.

NOTE 1 The thermal withstand capability should be taken into consideration.

NOTE 2 Since the coincidence of electrostatic discharge and a fault is considered to be extremely unlikely, the effect of the discharge on the relay in its transitional or operating condition is not considered.

The points selected for the application of the test shall be those which are accessible to the operator under normal service conditions, including communication ports and those points for