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Electrical relays - Part 22: Electrical disturbance tests for measuring relays and protection equipment - Section two: Electrostatic discharge tests

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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Part 22:
Electrical disturbance tests for measuring relays and protection equipment
Section Two — Electrostatic discharge tests

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

This standard has been prepared by Sub-Committee 41B: Measuring relays and protection equipment, of IEC Technical Committee No. 41: Electrical relays.

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

Six Months' Rule	Report on Voting
41B(CO)44	41B(CO)48

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

ELECTRICAL RELAYS

Part 22: Electrical disturbance tests for measuring relays and protection equipment

Section Two - Electrostatic discharge tests

1 Scope and object

This standard is based on IEC 801-2 and it refers to that publication where applicable.

This standard specifies general requirements for electrostatic discharge tests of static measuring relays and protection equipment with or without output contacts.

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.

The tests specified in this standard are type tests.

NOTE - The tests may also, where appropriate, be applied to electromechanical relays, for example high speed or high sensitivity electromechanical relays.

The object of this standard is to state:

1) definitions of terms used;
2) test severity classes;
3) test conditions;
4) test procedures;
5) criteria for acceptance.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 255-6 (1988): Electrical relays, Part 6: Measuring relays and protection equipment.

IEC 801-2 (1984): Electromagnetic compatibility for industrial-process measurement and control equipment, Part 2: Electrostatic discharge requirements.

3 Definitions

For definitions of general terms, reference should be made to the IEC International Electrotechnical Vocabulary (IEV) [IEC 50]. For special terms used, reference is made to clause 4 of IEC 801-2.

4 Electrostatic discharge disturbance test

4.1 *Test severity classes*

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

General guidance for the selection of test severity classes is given in Appendix B.

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.

Class	*Test voltage*
0	-
I	2 kV ± 10%
II	4 kV ± 10%
III	8 kV ± 10%
IV	15 kV ± 10%

Class III is applicable to measuring relays and protection equipment for normal use in power plants, substations and industrial plants.

However, manufacturers may claim a lower severity class for any situation where the relay or protection equipment covers are opened or removed, e.g. for changing settings.

For situations involving a very severe electrostatic environment, testing with higher voltage levels than specified in Class IV is subject to agreement between the user and manufacturer or as defined by the manufacturer.

4.2 *Discharge generator*

The discharge generator is defined in clause 6 of IEC 801-2.

4.3 *Test procedures*

The tests shall be carried out with the equipment under reference conditions stated in the applicable standard (e.g. IEC 255-6).

The tests shall be carried out with auxiliary energizing quantities and loading applied to the appropriate circuits and having values equal to rated conditions.

The value of the input energizing quantities shall be as close as possible to the transitional state, but not closer than the claimed variation due to electrostatic discharge disturbance (for examples, see Appendix A).

The setting and variation shall be declared by the manufacturer.

NOTES

1 The thermal withstand capability should be taken into consideration.

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 operate condition is not considered.

The equipment shall be tested in as close to installed conditions as possible. Wiring shall be consistent with the manufacturer's recommended procedures, and the equipment shall be tested in its case. All parts intended to be earthed shall be earthed with copper straps of at least 20 mm width.

A ground reference plane shall be used to get reproducible conditions regarding the capacitive coupling. The plane shall consist of a metallic sheet with conductivity of at least that of aluminium and with at least 0,3 mm thickness and a minimum size of 1 m². The size is also determined by the fact that the ground reference plane shall project beyond the equipment under test at least 0,1 m on all sides. The ground reference plane shall be connected to the earthing system of the test room.

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

Cables interconnecting the various part of the equipment under test shall be kept at a distance of at least 0,1 m from the ground plane.

The discharge generator shall be earthed via its 2 m grounding cable directly to the ground reference plane, close to the equipment under test.

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

The discharge generator voltage shall be adjusted to the severity class chosen.

The discharge electrode shall approach the equipment under test perpendicularly. The test shall be repeated at least ten times with a time interval between tests of at least 1 s on each test point selected.

The points selected for the application of the test shall be those which are accessible to the operator under normal service conditions including those setting adjustments that can only be accessed by removing the relay

cover. Setting adjustments which necessitate any action other than removal of the cover, e.g. removal of a module, are not included. The application of discharge to any point of the equipment which is accessible only for repair and maintenance purposes is outside the scope of this standard.

In the selection of the test points, notice shall be given to the following:

- Knobs, push-buttons, switches, terminals, etc., accessible under normal service.

- Points on covers of insulating material where conducting parts are close to the cover inside.

- Points on conducting parts not belonging to but placed in the vicinity of the equipment under test, when this has an insulating cover.

During the test, the grounding cable of the discharge generator shall be at a distance of at least 0,1 m from the equipment under test and at least 0,2 m from metal surfaces other than the ground reference plane.

The tests defined in IEC 801-2 cover positive discharges. This type of discharge is applicable for this standard.

Tests with negative discharge are subject to agreement between the manufacturer and the user or as defined by the manufacturer (see Appendix B).

4.4 *Criteria for acceptance*

During the test, no maloperation shall occur. Transient false information given by indicating devices, such as light emitting diodes (LEDs), etc., shall be tolerated.

After the test, the relay shall still comply with the relevant performance specification.