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Namestitev in delovanje električne preskusne opreme

Erection and operation of electrical test equipment

Errichten und Betreiben elektrischer Prüfanlagen

Installation et exploitation des équipements électriques d'essais

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Installation et exploitation des équipements électriques d'essais

Errichten und Betreiben elektrischer Prüfanlagen

This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
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CENELEC

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1 # Foreword

2 This draft European Standard was prepared by CENELEC BTTF 128-2, Erection and operation of
3 electrical test equipment. It is submitted to the CENELEC enquiry.

4 This document will supersede EN 50191:2000.

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Introduction

With reference to Clause 5 of this European Standard, prepared in the field of application of Article 137 of the EC Treaty, the user should be aware that standards have no formal legal relationship with Directives which may have been made under Article 137 of the Treaty. In addition, national legislation in the Member states may contain more stringent requirements than the minimum requirements of a Directive based on Article 137 of the Treaty. Information on the relationship between the national legislation implementing Directives based on Article 137 of the Treaty and this European Standard may be given in a national foreword of the national standard implementing this European Standard.

1 Scope

1.1 This European Standard is applicable to the erection and operation of fixed and temporary electrical test installations.

1.2 Compliance with this European Standard is not necessary, if contact with live parts presents no danger. This is the case when one of the following conditions is satisfied at live exposed points:

a) the voltage at frequencies above 500 Hz does not exceed 25 V a.c. or 60 V d.c. and complies with the requirements for SELV or for PELV in accordance with HD 384.4.41;

b) in case of voltages at frequencies up to 500 Hz exceeding 25 V a.c. or 60 V d.c., the resultant current through a non-inductive resistance of 2 kΩ does not exceed 3 mA a.c. (r.m.s.) or 12 mA d.c;

c) at frequencies above 500 Hz the national determined current and voltage values shall be applied. If there are no national requirements determined reference values for permissible body currents and contact voltages can be taken from Table A.1;

d) the discharge energy does not exceed 350 mJ.

NOTE 1 Even though compliance with the requirements of this European Standard is not necessary, if one of the above-mentioned conditions is satisfied, other potential risks e. g. risk of fire and explosion shall be considered and appropriate measures be taken.

NOTE 2 Ref. 1.2 b) & 1.2 d): The values for the resultant current of 3 mA a.c. or 12 mA d.c. and the discharge energy of 350 mJ comply with the values for live working specified in EN 50110-1. These values also comply with the values specified in IEC/TS 60479-1.

1.3 This European Standard does not apply to the power supply to the test installations. In this case, the standards of the HD 384 series (for nominal voltages up to 1 000 V) or HD 637 S1 (for nominal voltages exceeding 1 kV) are applicable to erection and EN 50110-1 is applicable to operation.

1.4 Where no requirements are given in this European Standard, the standards of the HD 384 series (for nominal voltages up to 1 000 V) or HD 637 S1 (for nominal voltages exceeding 1 kV) apply to the erection of electrical test installations and EN 50110-1 applies to the operation of electrical test installations.

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.

EN 294:1992 [1)], *Safety of machinery – Safety distance to prevent danger zones being reached by the upper limbs*

EN 418:1992 [2)], *Safety of machinery – Emergency stop equipment, functional aspects – Principles for design*

EN 574:1996 [3)], *Safety of machinery – Two-hand control devices – Functional aspects – Principles for design*

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1) Superseded by EN ISO 13857:2008, *Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs* (ISO 13857:2008).

2) Superseded by EN ISO 13850:2008, *Safety of machinery – Emergency stop – Principles for design* (ISO 13850:2006).

3) Withdrawn on 2008-06-25.

EN 999, *Safety of machinery – The positioning of protective equipment in respect of approach speeds of parts of the human body*

EN 50110-1, *Operation of electrical installations*

EN 60529, *Degrees of protection provided by enclosures (IP Code)* (IEC 60529)

EN 61219, *Live working – Earthing or earthing and short-circuiting equipment using lances as short-circuiting device – Lance earthing* (IEC 61219)

EN 61310-1, *Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, acoustic and tactile signals* (IEC 61310-1)

EN 61558 series, *Safety of power transformers, power supplies, reactors and similar products* (IEC 61558 series)

HD 366 S1:1977 [4)], *Classification of electrical and electronic equipment with regard to protection against electric shock* (IEC 60536:1976)

HD 384/60364 series, *Electrical installations of buildings/Low-voltage electrical installations* (IEC 60364 series, mod.)

HD 384.4.41:1996 [5)], *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock* (IEC 60364-4-41:1992, mod.)

HD 637 S1, *Power installations exceeding 1 kV a.c.*

IEC 60050-826, *International Electrotechnical Vocabulary – Part 826: Electrical installations*

3 Terms and definitions

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

3.1
electrical test installations
(referred to in the following as **test installations**)
the entirety of all the test devices, test appliances and facilities combined for test purposes, by means of which electrical tests are performed on test objects.

Types of test installations:

- test station;
- test laboratory or experimental station;
- temporary test installation

3.2
test station
appropriately identified test installation within a defined area. In test stations a distinction is made between those with and those without automatic positive protection against direct contact

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4) Superseded by EN 61140:2002, *Protection against electric shock – Common aspects for installation and equipment* (IEC 61140:2001).

5) Superseded by HD 60364-4-41:2007, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock* (IEC 60364-4-41:2005, mod.).

3.2.1
test station with automatic protection against direct contact
test station in which the test object and all live parts of the test installation have automatically activated full protection against direct contact in an energized condition

NOTE 1 At a test station with automatic protection against direct contact, there is generally only one person employed, e. g. in the line of series production or in electric workshops, repair and service shops.

NOTE 2 Automatic protection means that voltages can only occur when the safety devices are effective, e.g. when the cover or door of the test station is closed.

3.2.2
test station without automatic protection against direct contact
test station in which parts of the test object or live parts of the test installation are not fully protected against direct contact during testing. This includes, for instance, test areas in electric workshops, laboratories, measurement and experimental areas

3.3
test laboratory
test installations with minimum one test station in a securely enclosed space or within an area separated from adjacent work areas, in which several persons are generally employed on test work on larger test objects remaining there for a longer period of time

3.4
experimental station
test installations with minimum one test station for performing experiments or tests within the scope of research and development work. In general, no routine tests are performed in experimental stations. A variety of test assemblies as well as different hazards shall therefore be anticipated

3.5
temporary test installation
test installation with minimum one test station erected for a short time in order to perform tests on individual test objects

3.6
prohibition zone
volume around live parts which should not be breached if full protection against direct contact with these parts is not provided

3.7
test area
area around the test assembly which is separated from the surrounding area

3.8
signal lights
lights which are clearly visible from outside the boundaries of the test area giving red or green signals to indicate the operational status inside the test area

3.9
indicator lights
serve to indicate the switching status on the control panels. They are not an alternative to required signal lights

3.10
risk
combination of the probability and the degree of the possible injury or damage to health of a person exposed to a hazard or to hazards

3.11
electrical hazard
source of possible injury or damage to health in presence of electrical energy from an electrical installation

3.12
skilled person (electrically)
person with relevant education and experience to enable him or her to avoid dangers which electricity can create
(IEV 826-18-01, mod.)

3.13
instructed person (electrically)
a person adequately advised by skilled persons to enable him or her to avoid dangers which electricity can create
(IEV 826-18-02, mod.)

3.14
nominated person in control of a work activity
that person who has been nominated to be the person with direct management responsibility for the work activity. parts of this responsibility may be delegated to others as required

3.15 Operational status

3.15.1
out of operation
status when

a) all power supplies, signalling and control circuits are switched off and secured against unauthorized switching-on,

b) all safety precautions necessary before entering the test area (for voltages exceeding 1 kV, e.g. earthing, short-circuiting) have been taken

3.15.2
ready for operation
status when

a) the power supplies for the switchgear signalling and control circuits of the test installations are switched on,

b) the green signal lights, where these are required in accordance with the provisions in Clause 4, are on,

c) all power supplies for the test voltage are switched off and secured against unintentional switching,

d) the safety precautions specified in 3.15.1 b) ("out of operation") are in force

3.15.3
ready to switch on
status when

a) all power supplies for the test voltage are switched off,

b) all entries to the test area are closed,

c) the red signal lights are switched on,

d) the safety precautions specified in 3.15.1 b) ("out of operation") are no longer in force.

3.15.4
in operation
status when

a) all entries to the test area are closed,

b) the red signal lights are switched on,

c) one or more power supplies for the test voltage are switched on

NOTE In Clauses 4 and 5, the technical devices for setting up the operational status “ready for operation” and “ready to switch on” are only required for certain test installations with voltages exceeding 1 kV.

4 Erection of test installations

4.1 General

Test installations shall be performed and erected as a

- test station,
- test laboratory or experimental station,
- temporary test installation.

4.1.1 Protection against electric shock

4.1.1.1 Test assembly

The test assembly shall be so arranged and designed that the protection against direct contact is secured by insulation of live parts, covers, enclosures, obstacles or safe distances. A safe distance is ensured, when the person carrying out the tests cannot reach the prohibition zone with parts of his / her body or tools. Safety can also be satisfied by means of a two-hand control device or the use of two safety test probes to apply the test voltage. Test leads with full protection against direct contact shall be used. Two-hand control devices shall comply with EN 574:1996, Type II or IIIB. Where several persons are involved in a test, a two-hand control device shall be provided for each person of the test personnel and which are so connected that all the two hand controls are required to be operated before the test supplies can be energised.

Safety test probes shall have the adequate insulation level for the applied test voltage. No clamping devices shall be permitted for this purpose.

In case of measuring instruments and auxiliary appliances of protection Class I (HD 366, e.g. cathode ray oscilloscope, sine wave generator), where the protective conductor is interrupted to facilitate testing, e.g. because the enclosure has to be isolated from earth potential, the appliance shall be supplied from an isolating transformer in accordance with EN 61558 series.

If a circuit and/or the enclosure of a measuring instrument or an auxiliary appliance designed for mains connection is connected to live parts of the test assembly which can carry voltage to earth, then the internal insulation of the supplying isolating transformer shall be rated at least for this voltage.

An effective protective measure for fault protection (protection against indirect contact) shall be provided.

The test object shall be isolated from earth. If this is technically not possible e. g. due to the weight of the test object, than the test assembly shall be so designed and arranged in order to prevent the transfer of voltage to extraneous conductive parts.

Test table boards shall be made of insulating materials.

4.1.1.2 Prohibition zone

The boundary of the prohibition zone shall be determined in accordance with Table A.2 and is dependent on the test voltage.

In case of voltages up to 1 000 V, the surface of the live part is considered to be the boundary of the prohibition zone. In case of voltages exceeding 1 kV, reaching the prohibition zone is considered equal to touching live parts.