SLOVENSKI STANDARD
SIST EN 50110-1:1999

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Operation of electrical installations

Operation of electrical installations

Betrieb von elektrischen Anlagen

Exploitation des installations électriques

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ICS:

29.240.01	Omrežja za prenos in distribucijo električne energije na splošno	Power transmission and distribution networks in general

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English version

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This European Standard was approved by CENELEC on 1996-07-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Contents

Foreword

This European Standard was prepared by the CENELEC BT Task Force 62-3 "Operation of electrical installations". The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50110-1 on 1996-07-02 .

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	1997-06-01
- latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	1997-06-01

The purpose of this European Standard is to provide, in a convenient form, general requirements for the safe operation of and work activity on, with or near electrical installations.

Introduction

There are many national laws, standards and internal rules dealing with the matters coming within the scope of this standard and these practices have been taken as a basis for this work.

The standard consists of two parts. The first part EN 50110-1 contains Minimum Requirements valid for all CENELEC countries and some additional informative annexes dealing with safe working. The second part EN 50110-2 consists of a set of normative annexes (one per country) which specify either the present safety requirements or give the national supplements to these Minimum Requirements.

This concept is believed to be a first decisive step to the gradual alignment in Europe of the safety levels associated with the operation of, work activity on, with, or near electrical installations. This document acknowledges the present different national requirements for safety. The intention is, over the course of time, to create a common level of safety.
Even the best rules and procedures are of no value unless all persons working on, with, or near electrical installations are thoroughly conversant with them and with all legal requirements and comply strictly with them.

1 Scope

This standard is applicable to all operation of and work activity on, with, or near electrical installations. These installations operate at voltage levels from and including extra-low voltage up to and including high voltage.
This latter term includes those levels referred to as medium and extra-high voltage.

These electrical installations are designed for the generation, transmission, conversion, distribution and use of electrical power. Some of these electrical installations are permanent and fixed, such as a distribution installation in a factory or office complex, others are temporary, such as on construction sites and others are mobile or capable of being moved either whilst energized or whilst not energized nor charged. Examples are electrically driven excavating machines in quarries or open-cast coal sites.

This standard sets out the requirements for the safe operation of and work activity on, with, or near electrical installations. These requirements apply to operational, working and maintenance procedures. It applies to all electrical work activities as well as non-electrical work activities such as building work near to overhead lines or underground cables.

This standard does not apply to ordinary persons when using installations and equipment, provided that the installations and equipment are designed and installed for use by ordinary persons and they comply with relevant standards.

This standard has not been developed specifically to apply to the electrical installations listed below.

However, it is recommended that persons responsible for such installations should use this standard as a guide to the aims to be achieved in setting out their rules and procedures :

- on any aircraft and hovercraft moving under its own power, (these are subject to International Aviation laws which take precedence over National laws in these situations);
- on any sea going ship moving under its own power, or under the direction of the master, (these are subject to International Marine laws which take precedence over National laws in these situations) ;
- electronic telecommunications and information systems ;
- electronic instrumentation, control and automation systems ;
- at coal or other mines ;
- on off-shore installations subject to International Marine laws ;
- on vehicles ;
- on electric traction systems ;
- on experimental electrical research work .

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revisions. For undated references the latest edition of the publication referred to applies.

EN 60529	1991	Degree of protection provided by enclosures (IP Code) (IEC 529:1989, modified)
ENV 50196	1995	Live working - Required insulation level and related air distances - Calculation method
HD 384	series	Electrical installation of buildings. (IEC 364, modified)

International Electrotechnical Vocabulary:

IEC 50(151)	1978	Electrical and magnetic devices
IEC 50(601)	1985	Generation, transmission and distribution of electricity - General
IEC 50(604)	1987	Generation, transmission and distribution of electricity - Operation
IEC 50(826)	1982	Electrical installations of buildings

3 Definitions

For the purposes of this standard, the following definitions apply. Refer to the International Electrotechnical Vocabulary for other terms not defined below.

3.1 General

3.1.1 electrical installation
This includes all the electrical equipment which provides for the generation, transmission, conversion, distribution and use of electrical energy. It includes energy sources such as batteries, capacitors and all other sources of stored electrical energy.

3.1.2 operation
All activities including work activities necessary to permit the electrical installation to function. These activities include such matters as switching, controlling, monitoring and maintenance as well as both electrical and non-electrical work.

3.1.3 risk
A 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.

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

3.1.5 electrical danger
Risk of injury from an electrical installation.

3.1.6 injury (electrical)
Death or personal injury from electric shock, electric burn, arcing, or from fire or explosion initiated by electrical energy caused by any operation of an electrical installation.

3.2 Personnel, organization and communication

3.2.1 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.

3.2.2 nominated person in control of an electrical installation
That person who has been nominated to be the person with direct management responsibility for the electrical installation. Parts of this responsibility may be delegated to others as required.

3.2.3 skilled person
A person with relevant education and experience to enable him or her to avoid dangers which electricity may create. [IEV 826-09-01 modified]

3.2.4 instructed person
A person adequately advised by skilled persons to enable him or her to avoid dangers which electricity may create. [IEV 826-09-02 modified]

3.2.5 ordinary person
A person who is neither a skilled person nor an instructed person. [IEV 826-09-03]

3.2.6 notification
Messages or instructions which are either verbal or in writing associated with operation of any electrical installation.

3.3 Working zone

3.3.1 work location
The site(s), place(s) or area(s) where a work activity is to be, ist being, or has been carried out.

3.3.2 vicinity zone
A limited space surrounding the live working zone (see figures 1 and 2).

3.3.3 live working zone
A space around live parts in which the insulation level to prevent electrical danger is not assured when encroaching it without protective measures (see figures 1 and 2).

3.4 Working

3.4.1 work activity
Any form of electrical or non-electrical work where there is the possibility of an electrical hazard.

3.4.2 electrical work
Work on, with or near an electrical installation such as testing and measurement, repairing, replacing, modifying, extending, erection and inspection.

3.4.3 non-electrical work
Work near to an electrical installation such as construction, excavation, cleaning, painting, etc.

3.4.4 live working
All work in which a worker makes contact with live parts or reaches into the live working zone with either parts of his or her body or with tools, equipment or devices being handled.

3.4.5 working in the vicinity of live parts
All work activity in which a worker with part of his or her body, with a tool or with any other object enters into the vicinity zone without encroaching into the live working zone.

3.4.6 isolate
To disconnect completely a device or circuit from other devices and circuits.

3.4.7 dead
At or about zero voltage that is without voltage and/or charge present.

3.4.8 dead working
Work activity on electrical installations which are neither live nor charged, carried out after having taken all measures to prevent electrical danger.

3.5 Protective devices

3.5.1 screen
Any device, which may be insulated or not, which is used to prevent approach to any equipment or part of electrical installation which presents electrical danger.

3.5.2 barrier
A part providing protection against direct contact from any usual direction of access. [IEV 826-03-13]

3.5.3 insulating covering
A rigid or flexible cover made of insulating material used to cover live and/or unenergized parts and/or adjacent parts in order to prevent accidental contact.

3.5.4 enclosure
A part providing protection of equipment against certain external influences and, in any direction, protection against direct contact [IEV 826-03-12].

3.6 Nominal voltages

3.6.1 extra-low voltage (ELV)
Normally not exceeding 50 V alternating current (a.c.) or 120 V ripple free direct current (d.c.) whether between conductors or to earth, this includes SELV, PELV and FELV (see HD 384.4.41 S2 , section 411).

3.6.2 low voltage (LV)
Normally not exceeding 1 000 V a.c. or 1 500 V d.c..

3.6.3 high voltage (HV)
Normally exceeding 1 000 V a.c. or 1 500 V d.c. .

3.7 Distances

3.7.1 minimum working distance
The minimum working distance in air to be maintained between any part of the body of a worker, or any conductive tool being directly handled, and any part at different potentials, live or earthed. The minimum working distance is the sum of the electrical distance and the ergonomic component.

3.7.2 electrical distance
The distance in air which protects against electrical breakdown during live working. In generic terms, the electrical component is the minimum distance between two electrodes, which represent live and/or earthed parts, required to ensure that the probability of electrical breakdown is negligible when subjected to the most severe electrical stress likely to arise under the conditions prescribed.

3.7.3 ergonomic component
The distance in air which allows for limited errors in movement and judgement of distance during the work required to be carried out at the minimum working distance. This needs to take into consideration the actions of the person as well as the tools that are to be used and manipulated.

4 Basic principles

4.1 Safe operation

Before carrying out any operation of or work activity on, with, or near an electrical installation an assessment of the electrical risks shall be made. This assessment shall specify how the operation or work activity shall be carried out to ensure safety.

4.2 Personnel

The responsibilities placed upon persons for the safety of those engaged in a work activity and those who are or may be affected by the work activity shall be in accordance with National Legislation.

All personnel involved in a work activity on, with, or near an electrical installation shall be instructed in the safety requirements, safety rules and company instructions applicable to their work. These instructions shall be repeated during the course of the work where the work is long or complex. The personnel shall be required to comply with these requirements, rules and instructions.

Personnel shall wear suitable close fitting clothing.

Before any work activity is started and during that work activity, the nominated person in control of that work activity shall ensure that all relevant requirements, rules and instructions are complied with.

The nominated person in control of the work activity shall instruct all persons engaged upon the work activities of all dangers that are not immediately apparent to them.

No person shall undertake any work activity where technical knowledge or experience is needed to prevent electrical danger or injury, unless that person has such technical knowledge or experience, or is under such supervision as is necessary for the work undertaken.

National Legislation can set out the minimum age and the criteria for competence of persons.

Where there are no national requirements for competence, the following criteria shall be used in assessing the competence of persons:

- knowledge of electricity;

- experience of electrical work;

- understanding of the installation to be worked on and practical experience of that work;

- understanding the hazards which can arise during the work and the precautions to be observed;

- ability to recognize at all times whether it is safe to continue working.

The complexity of the work activity shall be assessed before the activity starts such that the appropriate choice of skilled, instructed, or ordinary person is made for carrying out the work activity.

4.3 Organization

Each electrical installation shall be placed under the responsibility of a person, the nominated person in control of the electrical installation. Where two or more installations come together, it is essential that there are formal arrangements between the nominated persons in control of each of those installations.

Access to all places where electrical hazards for ordinary persons are present shall be regulated. The method of regulation and control of access shall be the responsibility of the nominated person in control of the installation.