SLOVENSKI STANDARD
SIST HD 637 S1:1999

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Elektroenergetske naprave nad 1 kV izmeniļ ne napetosti

Power installations exceeding 1 kV a.c.

Starkstromanlagen mit Nennwechselspannungen über 1 kV

Installations électriques de tensions nominales supérieures à 1 kV en courant alternatif

Ta slovenski standard je istoveten z: **HD 637 S1:1999**

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29.240.01	Omreģja za prenos in distribucijo elektriļ ne energije na sploģno	Power transmission and distribution networks in general

SIST HD 637 S1:1999 **sl**

HARMONIZATION DOCUMENT

DOCUMENT D'HARMONISATION

HARMONISIERUNGSDOKUMENT

HD 637 S1

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English version

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This Harmonization Document was approved by CENELEC on 1999-01-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

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

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, 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

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Foreword

This Harmonization Document was prepared by the Technical Committee CENELEC TC 99X „Power Installations exceeding AC 1 kV (DC 1,5 kV)".

The text of the draft was submitted to the formal vote and was approved by CENELEC as HD 637 S1 on 1999-01-01.

During the draft stage this standard was labelled prEN 50179; it is cited under this number in various other European Standards, such as EN 50110-1.

The purpose of this Harmonization Document is to provide, in a convenient form, general requirements for the design and the erection of electrical power installations in systems with nominal voltages above 1 kV a.c.

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

The standard and its normative and informative annexes identifies installation characteristics which represent the minimum attainable for all CENELEC countries under stated conditions. These characteristics ensure an acceptable reliability of an installation and its safe operation.

The standard is supplemented by an informative annex of A-deviations and a normative annex of Special National Conditions and National Provisions (part of national standards, specifications or practices). These annexes identify, as appropriate, where such minimum attainable characteristics require adjustments to take account of national legislation and/or the local environment.

This concept is believed to be a first decisive step to the gradual alignment in Europe of the practices concerning the design and erection of power installations.

The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 1999-07-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 2000-01-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 2001-01-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A to G and T are normative and annexes H to S and U are informative.

Table of Contents

1 Scope and normative references

1.1 This standard contains the requirements for the design and erection of electrical installations, in systems with nominal voltage above 1 kV a.c., so as to provide safety and proper functioning for the use intended.

For the purpose of interpreting this standard an electrical power installation is considered to be one of the following:

a) Substation
A closed electrical operating area with switchgear and/or transformers in a transmission or distribution network. When switchgear and/or transformers are located outside a closed electrical operating area, this is also taken to be an installation.

b) One or more generating stations located on a single site.
The installation includes generator and transformer units with all associated switchgear and all electrical auxiliary systems. Connections between generating stations located on different sites are excluded.

c) The electrical system of a factory, industrial plant or other industrial, agricultural, commercial or public premises.
Connections between closed electrical areas (including substations), located on the same site, are taken to be part of the installations, except where such connections form part of a transmission or distribution network.

The electrical power installation includes among others, the following equipment:

- generators, motors and other rotating machines;
- switchgear;
- transformers;
- converters;
- cables;
- lines;
- wiring systems;
- batteries;
- capacitors;
- earthing systems;
- buildings and fences which are part of a closed electrical operating area
- associated control equipment.

1.2 This standard does not apply to the design and erection of:

- Overhead and underground lines between separate installations;
- Electric railways (but does apply to the substation feeding a railway system);
- Mining equipment and installations (except for opencast mining);
- Fluorescent lamp installations;
- Installations on ships and off-shore installations;
- Electrostatic equipment;
- Test sites;
- Medical equipment, e.g. medical X-ray equipment.

1.3 This standard does not apply to the design of factory-built, type tested switchgear for which separate IEC or CENELEC standards exist.

1.4 Normative references

This Harmonization Document 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 Harmonization Document only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 50014	Electrical apparatus for potentially explosive atmospheres General requirements
EN 50015	Electrical apparatus for potentially explosive atmospheres Oil immersion 'o'
EN 50016	Electrical apparatus for potentially explosive atmospheres Pressurized apparatus 'p'
EN 50017	Electrical apparatus for potentially explosive atmospheres Powder filling 'q'
EN 50018	Electrical apparatus for potentially explosive atmospheres Flameproof enclosure 'd'
EN 50019	Electrical apparatus for potentially explosive atmospheres Increased safety 'e'
EN 50020	Electrical apparatus for potentially explosive atmospheres Intrinsic safety "i"
EN 50028	Electrical apparatus for potentially explosive atmospheres Encapsulation 'm'
EN 50110-1	Operation of electrical installations
EN 50110-2	Operation of electrical installations (national annexes)
EN 50265-1	Common test methods for cables under fire conditions – Test for resistance to vertical flame propagation for a single insulated conductor or cable Part 1: Apparatus
EN 50265-2-1	Common test methods for cables under fire conditions – Test for resistance to vertical flame propagation for a single insulated conductor or cable Part 2-1: Procedures – 1 kW pre-mixed flame
EN 50265-2-2	Common test methods for cables under fire conditions – Test for resistance to vertical flame propagation for a single insulated conductor or cable Part 2-2: Procedures – Diffusion flame
EN 50267-2-3	Common test methods for cables under fire conditions – Tests on gases evolved during combustion of materials from cables Part 2-3: Procedures – Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity
EN 60060-2	High-voltage test techniques - Part 2: Measuring systems
EN 60068 (series)	Environmental testing
EN 60071-1	Insulation co-ordination -- Part 1: Definitions, principles and rules

EN 60071-2	Insulation co-ordination -- Part 2: Application guide
EN 60076-2	Power transformers -- Part 2: Temperature rise
EN 60255-6	Electrical relays - Part 6: Measuring relays and protection equipment
EN 60298	A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
EN 60517	Gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above
EN 60617-13	Graphical symbols for diagrams - Part 13: Analogue elements
EN 60622	Sealed nickel-cadmium prismatic rechargeable single cells
EN 60623	Vented nickel-cadmium prismatic rechargeable single cells
EN 60694	Common specifications for high-voltage switchgear and controlgear standards
EN 60721-1	Classification of environmental conditions Part 1: Environmental parameters and their severities
EN 60721-3 (series)	Classification of environmental conditions -- Part 3: Classification of groups of environmental parameters and their severities
EN 60865-1	Short-circuit currents -- Calculation of effects Part 1: Definition and calculation methods
EN 60896-1	Stationary lead-acid batteries -- General requirements and methods of test Part 1: Vented types
ENV 61024-1	Protection of structures against lightning -- Part 1: General principles
EN 61082-1	Preparation of documents used electrotechnology Part 1: General requirements
EN 61100	Classification of isolating liquids according to fire point and net calorific value
EN 61219	Live working – Earthing or earthing and short-circuiting equipment using lances as short-circuiting device – Lance earthing
EN 61230	Live working - Portable equipment for earthing or earthing and short-circuiting
EN 61330	High voltage/low-voltage prefabricated substations
HD 246.2	Diagrams, charts, tables -- Part 2: Item designation (IEC 60113-2)
HD 384.3	Electrical installations of buildings Part 3: Assessment of general characteristics (IEC 60364-3, modified)
HD 384.4.442	Electrical installations of buildings -- Part 4: Protection for safety Chapter 44: Protection against overvoltages Section 442: Protection of low-voltage installations against faults between high-voltage systems and earth
HD 405.3	Tests on electric cables under fire conditions Part 3: Tests on bunched wires or cables (IEC 60332-3)
HD 464	Dry-type power transformers (IEC 60726, modified)

HD 472	Nominal voltages for low-voltage public electricity supply systems (IEC 60038, modified)
HD 478 (series)	Classification of environmental conditions (IEC 60721 series)
HD 533	Short-circuit current calculation in three-phase a.c. systems (IEC 60909, modified)
HD 606 (series)	Measurement of smoke density of electric cables burning under defined conditions (IEC 61034 series, modified)
IEC 60044-6	Instrument transformers -- Part 6: Requirements for protective current transformers for transient performance
IEC 60050 (series)	International electrotechnical vocabulary (IEV)
IEC 60287-3-1	Electrical cables – calculation of the current rating Part 3: Sections on operating conditions Section 1: Reference operating conditions and selection of cable type
IEC 60331	Fire-resisting characteristics of electric cables
IEC 60466	A.C. insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 38 kV
IEC 60478 (series)	Stabilized power-supplies, d.c. output
IEC 60478-1	Stabilized power-supplies, d.c. output -- Part 1: Terms and definitions
IEC 60478-2	Stabilized power-supplies, d.c. output -- Part 2: Rating and performance
IEC/TR2 60479-1	Effects of current on human beings and livestock -- Part 1: General aspects
IEC 60518	Dimensional standardization of terminals for high-voltage switchgear and controlgear
IEC 60724	Guide to the short-circuit temperature limits of electric cables with a rated voltage not exceeding 0,6/1,0 kV
IEC/TR 60815	Guide for the selection of insulators in respect of polluted conditions
IEC/TR 60826	Loading and strength of overhead transmission lines
IEC 60949	Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects
IEC 61243 (series)	Live working – Voltage detectors
IEC/TR2 61634	High-voltage switchgear and controlgear - Use and handling of sulphur hexafluoride (SF_6) in high-voltage switchgear and controlgear
CISPR 18 (series)	Radio interference characteristics of overhead power lines and high-voltage equipment
ISO 1996 (series)	Acoustics – Description and measurement of environmental noise
Official Journal of the European Communities	No. C 62/23 dated 28.2.1994: Interpretative document, Essential requirement No. 2, "Safety in case of fire"

2 Definitions

For the purposes of this standard, the following definitions apply:

2.1 General definitions

2.1.1 **electrical equipment:** Any items used for such purposes as generation, conversion, transmission, distribution and utilization of electrical energy, such as machines, transformers, apparatus, measuring instruments, protective devices, equipment for wiring systems, appliances. (IEV 826-07-01)

2.1.2 **nominal value:** A suitable approximate quantity value used to designate or identify a component, device or equipment. (IEV 151-04-01)

2.1.3 **nominal voltage of a system** A suitable approximate value of voltage used to designate or identify a system. (IEV 601-01-21)

2.1.4 **rated value:** A quantity value assigned, generally by the manufacturer, for a specified operating condition of a component, device or equipment. (IEV 151-04-03)

2.1.5 **highest voltage for equipment:** The highest r.m.s phase-to-phase voltage for which the equipment is designed in respect of its insulation as well as other characteristics which relate to this voltage in the relevant equipment standards. (IEV 604-03-01)

2.1.6 **tested connection zone:** A zone in the vicinity of equipment terminals which has passed a dielectric type test with the appropriate withstand value(s), the applicable conductors being connected to the terminals in a manner specified by the manufacturer of the equipment.

2.1.7 **isolating distance:** The clearance between open contacts meeting the safety requirements specified for disconnectors. (IEV 441-17-35)

2.1.8 **isolation:** The switching off or disconnection of an installation, a part of an installation or an equipment from all non-earthed conductors by creating isolating gaps or distances.

2.1.9 **live part:** A conductor or conductive part intended to be energized in normal use, including a neutral conductor, but, by convention, not a PEN conductor. (IEV 826-03-01)

2.2 Installations

2.2.1 **closed electrical operating area:** A room or location for operation of electrical installations and equipment to which access is intended to be restricted to skilled or instructed persons or to lay personnel under the supervision of skilled or instructed persons by e.g. opening of a door or removal of barrier only by the use of a key or tool, and which is clearly marked by appropriate warning signs.

NOTE: For example, these include closed switchgear and distribution installations, transformer cells, switchgear bays or cubicles, distribution installations in sheet metal housings or in other closed installations.

2.2.2 **operating areas subject to fire hazard:** Rooms, areas or locations, indoors or outdoors where there is a danger due to local or operating conditions that hazardous quantities of easily flammable solid materials may come so close to the electrical equipment as to cause a fire hazard resulting from the high temperature of the equipment or due to arcing.

2.2.3 **sump:** A receptacle which is intended to receive the insulating liquid of a transformer or other equipment in case of leakage. (modified IEV 605-02-30)

2.2.4 **catchment tank:** A collecting tank for the leakage liquids, rain water etc. for one or more transformers or other equipment.

2.2.5 **busbars (commonly called busbar):** In a substation, the busbar assembly necessary to make a common connection for several circuits. Example: three busbars for a three-phase system. (IEV 605-02-02)

2.2.6 **ferroresonance:** A resonance of the capacitance of an apparatus with the inductance of the saturable magnetic circuit of adjacent apparatus. (IEV 604-01-14)

2.2.7 **short circuit time constant of primary windings** (primary time constant): The time required for the DC component present in the short circuit primary winding current, following a sudden change in operating conditions, to decrease to 1/e, that is 0,368 of its initial value, the machine running at rated speed. (IEV 411-18-33)

2.2.8 **transient overvoltage:** A short duration overvoltage of few milliseconds, or less, oscillatory or non-oscillatory, usually highly damped. (IEV 604-03-13)

2.3 Types of installations

2.3.1 **outdoor installations:** Electrical installations which are outdoors.

2.3.1.1 **outdoor installations of open design:** Installations where the equipment does not have complete protection against direct contact and is directly exposed to the weather.

2.3.1.2 **outdoor installations of enclosed design:** Installations which provide full protection against direct contact and whose enclosure provides direct protection from the weather.

2.3.2 **indoor installations:** Electrical installations within a building or room in which the equipment is protected against the weather.

2.3.2.1 **indoor installations of open design:** Installations where the equipment does not have complete protection against direct contact.

2.3.2.2 **indoor installations of enclosed design:** Installations where the equipment has complete protection against direct contact.

2.3.3 **gas insulated substation:** A substation which is made up with metal enclosed switchgear, the internal insulation of which is provided by a gas other than air at atmospheric pressure.

2.3.4 **switchgear 'bay' or 'cubicle':** Each branch of a busbar in an installation.

2.4 Safety measures against electric shock

2.4.1 **protection against direct contact:** Measures which prevent persons coming into dangerous proximity to live parts or those parts which could carry a dangerous shock hazard voltage, with parts of their bodies or objects (reaching the danger zone).

2.4.2 **protection in case of indirect contact:** The protection of persons from dangers which could arise, in event of fault, from contact with exposed conductive parts of electrical equipment or extraneous conductive parts.

2.4.3 **enclosure:** A part providing protection of equipment against certain external influences and, in any direction, protection against direct contact. (IEV 826-03-12)

2.4.4 **barrier:** A part providing protection against direct contact from any usual direction of access. (IEV 826-03-13)

2.4.5 **obstacle:** A part preventing unintentional direct contact, but not preventing direct contact by deliberate action. (IEV 826-03-14)