SLOVENSKI STANDARD
oSIST prEN IEC 61936-2:2022

01-oktober-2022

Elektroenergetski postroji za izmenične napetosti nad 1 kV in enosmerne napetosti nad 1,5 kV - 2. del: Enosmerna napetost

Power installations exceeding 1 kV AC and 1,5 kV DC - Part 2: DC

Installations électriques de puissance de tension supérieure à 1 kV en courant alternatif et 1,5 kV en courant continu - Partie 2: Courant continu

Ta slovenski standard je istoveten z: **prEN IEC 61936-2:2022**

ICS:

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

oSIST prEN IEC 61936-2:2022 **en**

99/364/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61936-2 ED1**	
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IEC TC 99 : INSULATION CO-ORDINATION AND SYSTEM ENGINEERING OF HIGH VOLTAGE ELECTRICAL POWER INSTALLATIONS ABOVE 1,0 kV AC AND 1,5 kV DC

SECRETARIAT: Australia	SECRETARY: Ms Erandi Chandrasekare
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 22F,TC 115	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Power installations exceeding 1 kV AC and 1,5 kV DC - Part 2: DC

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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186 International Standard IEC 61936-2 has been prepared by technical committee 99: Insulation
187 co-ordination and system engineering and erection of electrical power installations above 1 kV
188 AC and 1,5 kV DC.

189 The text of this International Standard is based on the following documents:

Enquiry draft	Report on voting
99/XX/XX	99/XX/XX

190

191 Full information on the voting for the approval of this International Standard can be found in the
192 report on voting indicated in the above table.

193 This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

194 A list of all parts in the IEC 61936 series, published under the general title *Power installations*
195 *exceeding 1 kV AC and 1,5 kV DC*, can be found on the IEC website.

Notes concerning particular conditions in certain countries are provided in Annex G of IEC 61936-1: 2021.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

There are few 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.

This part of IEC 61936 contains the minimum requirements and some additional information which ensures an acceptable reliability of an installation and its safe operation.

The publication of this International Standard is believed to be a decisive step towards the gradual alignment all over the world of the practices concerning the design and erection of high voltage power installations.

Particular requirements for transmission and distribution installations as well as particular requirements for power generation and industrial installations are included in this standard.

The relevant laws or regulations of an authority having jurisdiction takes precedence.

220

221 # POWER INSTALLATIONS EXCEEDING 1 kV AC and 1,5 kV DC –
222
223 # Part 2: DC
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225

226 ## 1 Scope

227 This part of IEC 61936 provides, in a convenient form, requirements for the design and the
228 erection of DC installations in systems with nominal voltages above 1,5 kV DC, so as to provide
229 safety and proper functioning for the use intended.

230 For the purpose of interpreting this standard, a DC installation is considered to be one of the
231 following:

232 a) A converter station or DC switching station;

233 b) one (or more) DC generating or storage unit(s), such as solar farms or battery storage units,
234 located on a single site, the DC installation includes DC equipment and cables with all
235 associated power electronics, controlgear, switchgear and all electrical auxiliary systems.
236 Connections between DC generating or storage units located on different sites are excluded;

237 c) DC installation erected on offshore facilities for the purpose of generation, transmission,
238 distribution and/or storage of electricity; or

239 d) DC transition station (between overhead lines and underground cable or between different
240 sections of underground cables).

241 This International Standard does not apply to the design and erection of any of the following:

242 – overhead and underground lines between separate installations;

243 – electric railways;

244 – mining equipment and installations;

245 – installations on ships according to IEC 60092 series and offshore units according to IEC
246 61892 series, which are used in the offshore petroleum industry for drilling, processing and
247 storage purposes;

248 – electrostatic equipment (e.g. electrostatic precipitators, spray-painting units);

249 – test sites;

250 – medical equipment, e.g. medical X-ray equipment;

251 – valve hall or converter hall.

252 This International Standard does not apply to the requirements for carrying out live working on
253 electrical installations.

254 This International Standard does not apply to the design of factory-built, type-tested thyristor
255 valves, VSC valves and switchgear for which separate IEC standards exist.

256 ## 2 Normative references

257 The following documents, in whole or in part, are normatively referenced in this document and
258 are indispensable for its application. For dated references, only the edition cited applies. For
259 undated references, the latest edition of the referenced document (including any amendments)
260 applies.

261 IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

262 IEC 60071-1, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60071-2:2018, *Insulation co-ordination – Part 2: Application guidelines*

IEC 60071-5, *Insulation co-ordination – Part 5: Procedures for high voltage direct current (HVDC) converter stations*

IEC 60071-11, *Insulation co-ordination for HVDC system — Part 11 : Definitions, principles and rules*

IEC/IEEE 60076-57-129, *Power transformers - Part 57-129: Transformers for HVDC applications*

IEC 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60079-10-2, *Explosive atmospheres – Part 10-2: Classification of areas – Combustible dust atmospheres*

IEC TS 60479-1:2018, *Effects of current on human beings and livestock – Part 1: General aspects*

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

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems Part 1: Principles, requirements and tests*

IEC TR 61000-5-2, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 2: Earthing and cabling*

IEC 61000-6-5:2015, *Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment*

IEC 61936-1:2021, *Power installations exceeding 1 kV AC – Part 1: Common rules*

IEC 61975:2010 – *High-voltage direct current (HVDC) installations – System tests*

IEC 62271-1:2017, *High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear*

IEC TR 62757, *Fire prevention measures on converters for high-voltage direct current (HVDC) systems, static var compensators (SVC) and flexible AC transmission systems (FACTS) and their valve halls*

IEC TR 63065:2017, *Guidelines for operation and maintenance of line commutated converters (LCC) HVDC converter station*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61936-1 and the following apply.

3.1
electronic valve device
indivisible electronic device for electronic power conversion or electronic power switching, comprising a single non-controllable or bistably controlled unidirectionally conducting current path.

NOTE 1 to entry: Typical electronic valve devices are thyristors, power rectifier diodes, power switching bipolar and field effect transistors and insulated-gate bipolar transistors (IGBT).

NOTE 2 to entry: Two or more electronic valve devices may be integrated on a common semiconductor chip (examples: a thyristor and a rectifier diode in a reverse conducting thyristor, a power switching field effect transistor with its inverse diode) or packaged in a common case (semiconductor power module). These combinations are to be considered as separate electronic valve devices.

[SOURCE: IEC 60050-551:1998, 551-14-02]

3.2
nominal DC voltage, <of a system>
U_{dn}
suitable approximate value of DC voltage used to designate or identify a system, expressed as the absolute value of the pole to earth voltage.

3.3
highest DC voltage, <of a DC system>
U_{dm}
highest mean or average pole DC voltage to earth, excluding harmonics, commutation and dynamic overshoots, for which the installation is designed in respect of its insulation.

3.4
DC neutral point
common point of two monopoles forming a bipole converter or the earthed point of a monopole converter.

3.5
DC electrode line
electrical connection between a DC earth electrode and the DC installation.

3.6
DC system
for the purposes of this standard is defined to be all interconnected parts of a power system installation that is installed between and including the DC side windings of the interface/converter transformers at each terminal except for the valve hall or converter hall.

NOTE Components connected to the AC side windings of the converter/interface transformers including the AC windings themselves are not considered to be part of the DC system as defined for this standard.

3.7
high voltage
DC voltage exceeding 1 500V DC.

3.8
low voltage
DC voltage not exceeding 1 500V DC.

3.9
converter unit
indivisible operative unit comprising all equipment between the point of connection on the AC side (or DC side for DC/DC converters) and the point of connection on the DC side, essentially one or more converters, together with converter transformers, control equipment, essential protective and switching devices and auxiliaries, if any, used for conversion.

3.10
converter station
part of an DC system which consists of one or more converter units including DC switchgear, DC fault current controlling devices, if any, installed in a single location together with buildings, reactors, filters, reactive power supply, control, monitoring, protective, measuring and auxiliary equipment.

3.11
DC earth electrode

array of conductive elements placed in the earth, or the sea, which provides a low resistance path between a point in the DC system and the earth and are capable of carrying continuous current for some extended period.

NOTE 1 to entry: An earth electrode may be located at a point some distance from the HVDC substation.

NOTE 2 to entry: Where the electrode is placed in the sea it may be termed as sea electrode.

[SOURCE: IEC 60633:1998, 8.14, modified – The indication "DC" has been added to the term and a synonym, DC earth electrode, has been added.]

3.12
pole
part of an DC system consisting of all the equipment in the HVDC substations and interconnecting transmission lines, if any, which during normal operation, exhibit a common direct voltage polarity with respect to earth.

[SOURCE: IEC 60633:1998, 8.5]

3.13 protective level
for each voltage class, residual voltage that appears between the terminals of an arrester during the passage of a discharge current corresponding to the co-ordination current.

[SOURCE: IEC 60071-5:2014, 3.16]

3.14
lightning impulse protective level, <of a protective device>
$\boldsymbol{U}_{\mathbf{pl}}$
maximum permissible peak voltage value, on the terminals of a protective device subjected to lightning impulses under specific conditions.

[SOURCE: IEV, 614-03-56]

3.15
switching impulse protective level, <of a protective device>
$\boldsymbol{U}_{\mathbf{ps}}$
maximum permissible peak voltage value, on the terminals of a protective device subjected to switching impulses under specific conditions.

[SOURCE: IEV 614-03-57]

Symbols and abbreviations

LCC	Line commutated converter
N	Minimum clearance of danger zone as defined in IEC 61936-1:2021
POI	Point of Interconnection
U_{dm}	highest DC voltage
U_{pl}	lightning impulse protective level
U_{ps}	switching impulse protective level
VSC	Voltage source converter