



NSAI
Standards

Standard Recommendation
S.R. 61936-1:2019

Guidelines on the application of I.S. EN 61936-1:2010&A1:2014, Power installations exceeding 1 kV a.c. - Part 1: Common rules

S.R. 61936-1:2019

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Standard Recommendation Foreword

This Standard Recommendation was developed by NSAI ETC TC03 "Power installations exceeding 1 kV (1,5 kV d.c.)".

S.R. 61936 replaces Electro-Technical Council of Ireland (ETCI) ET 103 "National Rules for Electrical Installations Power installations exceeding 1 kV a.c".

Irish national guidance is contained in shaded boxes such as this one.

For ease of reading CENELEC "COMMON MODIFICATIONS" and certain bibliographic references have been inserted into the main text in the relevant locations with the following prefix "**EN 61936-1:2010** -".

In this S.R., 'high voltage' means any voltage exceeding 1 kV a.c. or 1,5 kV d.c. Inspection and testing certification guidance is contained within Clause 11.

In Ireland the Grid Code and Distribution Code apply under S.I. No. 445/2000 - European Communities (Internal Market in Electricity) Regulations, 2000 [58]. System installers are obliged to comply with these. The Grid Code [48] is the technical document which establishes the rules governing the operation, maintenance and development of the transmission system and sets out the procedures for governing the actions of all transmission system users. The Distribution Code [49] defines the technical aspects of the working relationship between Distribution System Operator (DSO) and all Users of the Distribution System, to ensure an efficient, co-ordinated and economical system for electricity distribution.

In Ireland the Safety, Health and Welfare at Work legislation [53] applies.

Compliance with this Standard Recommendation does not of itself confer immunity from legal obligations.

In line with international Standards practice the following representation of numbers and numerical values apply:

- The decimal point is shown as a comma (,) throughout this Standard Recommendation.
- Each group of three digits reading to the left or to the right of a decimal sign are separated by a space from the preceding digits or following digits respectively.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

POWER INSTALLATIONS EXCEEDING 1 kV AC –

Part 1: Common rules

FOREWORD

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This Consolidated version of IEC 61936-1 bears the edition number 2.1. It consists of the second edition (2010-08) [documents 99/95/FDIS and 99/96/RVD] and its amendment 1 (2014-02) [documents 99/129/FDIS and 99/131/RVD]. The technical content is identical to the base edition and its amendment.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through. A separate Final version with all changes accepted is available in this publication.

This publication has been prepared for user convenience.

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International Standard IEC 61936-1 has been prepared by IEC technical committee 99: System engineering and erection of electrical power installations in systems with nominal voltages above 1 kV a.c. and 1,5 kV d.c., particularly concerning safety aspects.

The main changes with respect to the previous edition are listed below:

- new table of references for additional agreements between manufacturer/contractor/planner and user/orderer/owner (4.1.2)
- addition of minimum clearances in air not standardized by IEC but based on current practice in some countries (Annex A)
- deletion of nominal voltages (Table 1, Table 2, Clause 5)
- addition of regulations for fuses (6.2.15)
- simplification of regulations for escape routes (7.5.4)
- deletion of special regulations for operating aisles (7.5.4)
- modification of clearances for fire protection (Table 3)
- modification of safety criteria for earthing systems (10.2.1)
- modified curves of permissibly touch voltages (Figure 12, Annex B)
- deletion of numbering of subclauses without headlines
- change of "should" to "shall" in many cases or change of subclauses with "should" to a note

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

A list of all the parts¹ in the IEC 61936 series, under the general title *Power installations exceeding 1 kV a.c.*, can be found on the IEC website

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The following differences exist in the countries indicated below.

- 4.3.2: The combinations are for example: –40 °C without ice and without wind; –0 °C with ice and without wind; –20 °C with wind. For special projects even value –50 °C without ice and without wind could be needed (Finland)
- 4.4.2.2a: Even class –50 °C could be needed (Finland)
- 6.2.4.1: It shall not be fuses in conductors from current transformers (Norway)
- 7.2.1: Barriers for outdoor installations shall have a minimum height of 2,0 m. They shall fulfil the same requirements as the external fence. The minimum height of live parts behind a barrier shall be $N + 300$ mm with a minimum of 800 mm (Finland)
- 7.2.2: The use of protective method obstacles is not allowed in electrical installations outside of buildings (Finland)
- 7.2.2: Rails, chains and ropes are not allowed as obstacles (Sweden)
- 7.2.2: The height H for outdoor installations shall be at least $H = N + 2\,500$ mm, with a minimum of 3 000 mm (Sweden)
- 7.2.4: The height H for outdoor installations shall be at least $H = N + 2\,500$ mm, with a minimum of 3 000 mm (Sweden)
- 7.2.4: The height H for outdoor installations shall be at least $H = N + 2\,600$ mm, with a minimum of 2 800 mm (Finland)
- 7.2.6: The height of the external fence shall be at least 2 000 mm. The local conditions of snow shall be taken into account (Finland)
- 7.2.6: The height of the external fence shall be at least 2 500 mm (Australia)

¹ At the time of writing, future parts are still under consideration.

- 7.2.6: 50 mm × 200 mm mesh is not accepted (Australia)
- 7.2.6: Guidance regarding fence construction can be found at ENA Doc 015 (Australia)
- 7.3: The use of indoor installations of open design is not allowed (Finland)
- 7.3: A rail shall be of not conductive material in the colours yellow/black behind (cell) doors and openings wider than 0,5 m (Norway)
- 7.3: Rails, chains and ropes are not allowed as obstacle (Sweden)
- 7.4.1: Outside closed electrical operation areas equipment and cables shall either be constructed with an earthed intermediate shield or be protected against unintentional contact by placing out of reach. With an earthed intermediate shield, a metal enclosure for equipment or a screen for cables are understood (Sweden)
- 7.5.4: Gangways longer than 10 m shall be accessible from both ends. Indoor closed restricted access areas with length exceeding 20 m shall be accessible by doors from both ends (See IEC 60364-7-729) (Sweden)
- 7.5.8: Installations that are difficult to evacuate like Installations in underground, in mountains, wind-power stations e.g. special conditions shall be imposed to secure safe evacuation in case of fire or accident (Norway)
- 7.7: The minimum height H' of live parts above surfaces accessible to the general public shall be:
 - $H' = 5\ 500$ mm for rated voltages U_m up to 24 kV
 - $H' = N + 5\ 300$ mm for rated voltages U_m above 24 kV (Finland)
- 8.2: Exposed conductive parts shall be earthed. Also extraneous conductive parts which by faults, induction, or influence could become live and be a hazard to persons or damage to property shall be earthed (Sweden)
- 8.2.1.2: The minimum height of protective barriers is 2 300 mm (Finland)
- 8.2.1.2: Rails, chains and ropes are not allowed as obstacles (Sweden)
- 8.2.2.1: Outside closed electrical operation areas equipment and cables shall either be constructed with an earthed intermediate shield or be protected against unintentional contact by placing out of reach. With an earthed intermediate shield, a metal enclosure for equipment or a screen for cables are understood (Sweden)
- 8.2.2.2: Rails, chains and ropes are not allowed as obstacles (Sweden)
- 8.2.2.2: The use of protective method obstacles is not allowed in electrical installations of buildings. The use of protective method placing out of reach is restricted only to situations where the use of insulation or enclosures or barriers is not practicable (Finland)
- 8.7.1: Fire rating of barriers must be a minimum fire rating of 120 minutes (Australia)
- 8.7.2: The dimensions G1 and G2 are to be measured from the inside edge wall of any bund wall rather than the measured point shown in Figure 7a) and 7b) from the transformer where the bund wall is wider than the transformer (Australia)
- 8.7.2.1: For transformers with below 1000 l special conditions are listed in FEF 2006 §4-9 (Norway)
- 8.8.1.3: Spill containment should extend by 50 % of the height of the transformer (Australia)
- 8.9.1: Warning signs, markings and identifications shall be in Norwegian and special cases additional marking in other language (Norway)
- 10.2.1 and Annex B: Health & Safety Executive (HSE) has advised that HV earthing systems should be designed according to tolerable voltages based on body impedances not exceeded by 5% of the population, as given in Table 1 of IEC60479-1:2005 (UK)
- 10.2.1: Permissible touch and step voltages in power installations shall be in accordance with the Federal law concerning electrical installations (High and low voltage) (SR 734.0) and the Regulations for electrical power installations (SR 743.2 StV) (Switzerland)
- Figure 1: Rails, chains and ropes are not allowed as obstacles (Sweden)
- Figure 7a): The dimensions G1 and G2 are to be measured from the inside edge wall of any bund wall rather than the measured point shown in Figure 7a) from the transformer where the bund wall is wider than the transformer (Australia)
- Figure 7b): The dimensions G1 and G2 are to be measured from the inside edge wall of any bund wall rather than the measured point shown in Figure 7b) from the transformer where the bund wall is wider than the transformer (Australia)
- Clause 10: For requirements regarding earthing refer to AS 2067, Substations and High Voltage Installations (Australia)

The contents of the corrigendum of March 2011 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

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.

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

The publication of this 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.

POWER INSTALLATIONS EXCEEDING 1 kV AC –

Part 1: Common rules

1 Scope

This part of IEC 61936 provides common rules for the design and the erection of electrical power installations in systems with nominal voltages above 1 kV a.c. and nominal frequency up to and including 60 Hz, so as to provide safety and proper functioning for the use intended.

This Standard Recommendation applies to new installations and, under certain circumstances, for extensions to existing installations, see Clause 7.1.

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

a) Substation, including substation for railway power supply

b) Electrical installations on mast, pole and tower

Switchgear and/or transformers located outside a closed electrical operating area

c) One (or more) power station(s) located on a single site

The installation includes generators and transformers with all associated switchgear and all electrical auxiliary systems. Connections between generating stations located on different sites are excluded.

d) The electrical system of a factory, industrial plant or other industrial, agricultural, commercial or public premises

NOTE Requirements for installations in potentially explosive atmospheres are contained in I.S. EN 60079 [57].

e) Electrical installations erected on offshore platforms e.g. offshore wind power farms.

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

- rotating electrical machines;
- switchgear;
- transformers and reactors;
- converters;
- cables;
- wiring systems;
- batteries;
- capacitors;

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- earthing systems;
- buildings and fences which are part of a closed electrical operating area;
- associated protection, control and auxiliary systems;
- large air core reactor.

NOTE In general, a standard for an item of equipment takes precedence over this standard.

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

- overhead and underground lines between separate installations;
- electric railways;
- mining equipment and installations;
- fluorescent lamp installations;
- installations on ships according to IEC 60092 [34] series and offshore units according to IEC 61892 [35] series, which are used in the offshore petroleum industry for drilling, processing and storage purposes.
- electrostatic equipment (e.g. electrostatic precipitators, spray-painting units);
- test sites;

NOTE Test sites include HV test sets.

- medical equipment, e.g. medical X-ray equipment.

This standard does not apply to the design of prefabricated, type-tested switchgear and high voltage/low voltage prefabricated substation, for which separate IEC standards exist.

This standard does not apply to the requirements for carrying out live working on electrical installations.

If not otherwise required in this standard, for low-voltage electrical installations the standard series IEC 60364 applies.

For low-voltage electrical installations, unless otherwise stated in this Standard Recommendation, ET 101 [56] applies.

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