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Low-voltage auxiliary power systems - Part 2-1: Design criteria - General requirements

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FOREWORD

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IEC TS 63346-2-1 has been prepared by IEC project committee 127: Low-voltage auxiliary power systems for electric power stations and substations. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
127/87/DTS	127/88/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63346 series, published under the general title *Low-voltage auxiliary power systems*, can be found on the IEC website.

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

– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This part of IEC 63346 establishes the general principles for the design of low-voltage auxiliary power systems (APS) with nominal voltages below or equal to 1 kV AC and 1,5 kV DC, and nominal frequency up to and including 60 Hz, so as to provide safe and correct operation for the intended use.

This document applies to the design of low-voltage auxiliary systems for

– substations, which are part of an electrical system, confined to a given area, mainly including ends of transmission or distribution lines, electrical switchgear and controlgear, buildings and transformers,
– converter stations,
– hydropower stations, where the gravitational energy of water is converted into electricity, and
– thermal power stations, where the thermal energy is obtained by burning fossil fuels.

This document does not apply to the design of low-voltage auxiliary power systems of the following:

– nuclear power stations, which have extremely high safety requirements and special loads, such as nuclear measurement systems and protection systems;
– substations connecting a nuclear power station to the grid and its associated LV APS integrated with the nuclear power station;
– traction substation, which have different power supply requirements, such as unbalanced load power supply;
– offshore substations, for which it is important to take into account factors such as waves, typhoons and salt spray, which have different requirements for power supply and equipment selection.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60038:2009, *IEC standard voltages*

IEC 60079-0, *Explosive atmospheres - Part 0: Equipment - General requirements*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-1:2025, *Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics and definitions*

IEC 60364-4-42, *Low-voltage electrical installations - Part 4-42: Protection for safety - Protection against thermal effects*

IEC 60364-4-43, *Low-voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent*

IEC 60364-4-44, *Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-51:2005*, Electrical installations of buildings - Part 5-51: Selection and erection of electrical equipment - Common rules*

IEC 60364-5-52, *Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems*

IEC 60364-5-53, *Low-voltage electrical installations - Part 5-53: Selection and erection of electrical equipment - Devices for protection for safety, isolation, switching, control and monitoring*

IEC 60909-0*, Short-circuit currents in three-phase a.c. systems - Part 0: Calculation of currents*

IEC 60947-1, *Low-voltage switchgear and controlgear - Part 1: General rules*

IEC 60947-2, *Low-voltage switchgear and controlgear - Part 2: Circuit-breakers*

IEC 61439-1, *Low-voltage switchgear and controlgear assemblies - Part 1: General rules*

IEC 61439-2, *Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies*

IEC TR 61641, *Enclosed low-voltage switchgear and controlgear assemblies - Guide for testing under conditions of arcing due to internal fault*

IEC 61643-12, *Low-voltage surge protective devices - Part 12: Surge protective devices connected to low-voltage power systems - Selection and application principles*

IEC 61660-1, *Short-circuit currents in d.c. auxiliary installations in power plants and substations - Part 1: Calculation of short-circuit currents*

IEC 61936-1, *Power installations exceeding 1 kV AC and 1,5 kV DC - Part 1: AC*

IEC TS 63346-1-1, *Low-voltage auxiliary power systems - Part 1-1: Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 63346-1-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/
– ISO Online browsing platform: available at https://www.iso.org/obp

4 Basic requirements

4.1 Design principles

4.1.1 Safety

Safety is the first principle used for the design of APS. The design shall meet safety requirements in the following aspects: personnel safety, equipment safety and system safety. The APS shall be designed to protect personnel from injury in the process of the operation and the maintenance of equipment and system, as well as prevention of unsafe operation and maintenance by personnel that can result in equipment and system damage or cascading failures.