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Low-voltage auxiliary power systems -
Part 2-2: Design criteria - Low-voltage DC auxiliary power systems for substations

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Low-voltage auxiliary power systems - Part 2-2: Design criteria - Low-voltage DC auxiliary power systems for substations

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IEC TS 63346-2-2 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
127/86/DTS	127/89/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– withdrawn, or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 TS 63346 provides common rules and specific requirements for the design of low voltage DC auxiliary power systems (APSs) intended to be installed in substations, mainly covering the configuration of DC power sources, system wiring, electric equipment selection and physical layout.

For the purpose of interpreting this document, a DC APS in this document is considered as follows.

– Its scope covers from the low voltage AC input of the charger to the DC input points of loads. Though DC load is discussed where necessary, the load itself is beyond the scope of this document.
– Unless particularly stated, DC APS refers to the system using lead-acid and nickel-cadmium cells which are connected in series. The system using parallel cells can implement this document by reference.

Substations in this document refer to those which are part of an electrical system and contain equipment that either receives and distributes electrical energy or transforms voltages to the levels required by the loads they supply, or both.

This document does not apply to the design of any of the following:

– traction substation, which have different power supply requirements, such as unbalanced load power supply and harmonic behaviour;
– offshore substations, as factors such as waves, typhoons, salt spray, etc. need to be taken into account, which have different requirements for power supply and equipment selection;
– the substation connecting a nuclear power plant to the grid and its associated LV APS integrated with the nuclear power plant.

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, *IEC standard voltages*

IEC 60287 (all parts), *Electric cables - Calculation of the current rating*

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

IEC 60364-4-41, *Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock*

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, *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 60623, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Vented nickel-cadmium prismatic rechargeable single cells*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests*

IEC 60896-11, *Stationary lead-acid batteries - Part 11: Vented types - General requirements and methods of tests*

IEC 60896-22, *Stationary lead-acid batteries - Part 22: Valve regulated types - Requirements*

IEC 60898-3, *Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 3: Circuit-breakers for DC operation*

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

IEC 61056-1, *General purpose lead-acid batteries (valve-regulated types) - Part 1: General requirements, functional characteristics - Methods of test*

IEC 61439-1:2020, *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 62060:2001, *Secondary cells and batteries - Monitoring of lead acid stationary batteries - User guide*

IEC 62259, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Nickel-cadmium prismatic secondary single cells with partial gas recombination*

IEC 62485-2, *Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries*

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

IEC 63346-2-1, *Low-voltage auxiliary power systems - Part 2-1: Design criteria - General requirements*[1]

[1] Under preparation. Stage at the time of publication: IEC TS/BPUB 63346-2-1:2025.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminological 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

3.1.1
capacity
<for cells or batteries> electric charge which a cell or battery can deliver under specified discharge conditions

Note 1 to entry: The SI unit for electric charge is the coulomb (1 C = 1 A·s) but in practice, capacity is usually expressed in ampere hours (A·h).

[SOURCE: IEC 60050-482:2020, 482-03-14]

3.1.2
ambient temperature
<for electrical installations> temperature of the air or other medium within the proximity of an electrical installation

[SOURCE: IEC 60050-826:2022, 826-10-03]

3.1.3
isolated system
IT-system
system in which no live part is intentionally earthed, except for high impedance connections for protection or measurement purposes

[SOURCE: IEC 60050-195:2021, 195-04-07, modified - The second term "IT-system" has been added.]

3.1.4
meshed network
arrangement of electric conductor and boards forming a combination of star and loop circuits

3.2 Abbreviated terms

AC	alternating current
APS	auxiliary power system
CB	circuit breaker
DC	direct current
HV	high voltage
IFLS	insulation fault location system
IMD	insulation monitoring device
IT	isolated terra
LV	low voltage
Ni-Cd	nickel-cadmium