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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Safety requirements for secondary batteries and battery
installations - Part 5: Safe operation of stationary lithium-ion
batteries**

蓄电池和蓄电池组安装的安全要求 第5部分：固定锂离子电池的安全操作
(English Translation)

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1 Scope

This Document applies to one or more stationary batteries installed in any DC section of the power grid with a maximum total DC voltage not exceeding 1500V. It describes the main protective measures against hazards such as electrical, short circuit, electrolyte, gas emissions, fire, and explosion under normal operation or anticipated fault conditions.

This Document specifies the safety requirements related to the installation, use, inspection, maintenance, and disposal of lithium-ion batteries used in stationary applications.

This Document covers industrial stationary batteries installed in independent, enclosed buildings or houses, as well as stationary batteries installed in public buildings, offices, and private residences.

This Document applies to telecommunications, power plant operation, central emergency lighting and alarm systems, uninterruptible power supplies (UPS), stationary engine starting, and photovoltaic systems.

This Document does not cover batteries containing lithium metal.

Generally, the safety requirements for the installation of batteries and battery packs (based on

IEC 62485-1) provide general safety information and definitions for lead-acid, nickel-cadmium, and nickel-metal hybrid batteries.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 16935.1-2023 Insulation coordination for equipment within low-voltage supply systems - Part 1.Principles, requirements and tests (IEC 60664-1.2020, IDT)

IEC 62620.2014 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications

3 Terms, Definitions, and Abbreviations

For the purposes of this Document, the terms and definitions given in IEC 60050-482 and ISO/IEC Guide 51, as well as the following apply.

The websites for the terminology databases maintained by ISO and IEC for standardization are as follows.

3.1.1 Secondary lithium cell/cell

A storage battery that derives its electrical energy from the intercalation/deintercalation of lithium ions or the oxidation/reduction of lithium between the negative and positive electrodes.

NOTE 1: The cell typically has an electrolyte composed of lithium salts and organic solvent compounds in liquid, gel, or solid form; and has a metal or laminated thin-film casing.

NOTE 2: The cell is not yet ready for application because it lacks its final casing, electronic control unit, and terminals.

3.1.2 Home energy storage system; HESS

Stationary battery system that is used in or near single-family or multi-family homes, or for use as internal energy storage devices within a home.

NOTE: Home energy storage system is typically installed in rooms not designed as electrical service rooms or battery rooms.

3.1.3 Battery energy storage system; BESS

A stationary system for storing and converting electrical energy, containing the components required for this function, particularly the battery, power conversion system, and energy management system.

NOTE 1: Safety features and the casing are typically also part of the BESS.

NOTE 2: The power conversion system may be an AC/DC converter or a DC/DC converter used to charge or discharge the battery.

4.1 General

Safety regulations for the installation of batteries and battery packs shall comply with IEC 62485-1. Measures shall be taken in the charging equipment for stationary batteries to prevent direct contact (basic protection) and indirect contact (fault protection) with dangerous voltages.

These measures are described in detail in IEC 60364-4-41 and IEC 61140. The following subclauses describe typical measures and corresponding adjustments for battery installation.

Equipment standard IEC 61140 applies to batteries and DC power distribution circuits located inside equipment.

4.2 Basic protection

In battery installation, basic protection against contact with live parts shall be ensured in accordance with IEC 60364-4-41.

The following protective measures apply.

- Protection through insulation of live parts;
- Protection through barriers or fences;
- Protection using obstacles;
- Protection by placing the battery in an inaccessible location.

It is explicitly permitted that batteries be protected by obstacles or placed in inaccessible locations during installation. Batteries with a maximum voltage between terminals greater than

DC 60 V but not exceeding DC 120 V and/or a maximum voltage of the terminals to the ground greater than DC 60 V but not exceeding DC 120 V shall be placed in restricted access locations;

while batteries with a maximum voltage higher than DC 120 V shall be placed in locations with restricted access achieved by locking or other equivalent means. Doors to battery compartments and battery rooms are considered obstacles and shall be marked with warning labels as per 11.1.

Batteries with a maximum voltage less than or equal to DC 60 V do not require basic

protection, provided the entire installation meets the requirements for Safe Extra Low Voltage (SELV) and

Protective Extra Low Voltage (PELV) (see 4.4.2).

If barriers or fences are used for protection, the minimum required protection level shall comply with IP2X or IPXXB in IEC 60529.

4.3.1 General

In battery installations, fault protection shall be implemented in accordance with IEC 60364-4-

41. One or more of the following measures shall be selected.

- Protection by automatic power disconnection;
- Protection by using Class II equipment or equivalent insulation;
- Protection by non-conductive locations (for specific applications only);
- Protection by ungrounded local equipotential bonding (for specific applications only);
- Protection by electrical isolation.

The maximum contact voltage shall not exceed DC 120V (according to IEC 60449, IEC 60364-

4-41 and IEC/TS 61201). If this voltage is exceeded, other suitable protection measures shall be implemented. Under normal operating conditions, abnormal operating conditions, and single-fault conditions (except for safety measure failures), the contact voltage or contact current of all ungrounded accessible conductive parts shall be measured.

Some of these protective methods require a protective conductor. The protective conductor, or a conductor with protective functions, shall not be disconnected by a switching device.

Switching devices are not permitted in the protective conductor. The protective conductor shall not contain overcurrent protection devices (according to IEC 60364-4-41). For the dimension label of the protective conductor's cross-sectional area, see IEC 60364-5-54.

Battery racks or battery compartments made of metal shall be connected to the protective conductor or insulated from the battery and its installing location. This insulation shall comply with the insulation protection conditions of IEC 60364-4-41. For creepage distance and clearance requirements, according to IEC 60664-1, the rated impulse withstand voltage of a

Class II overvoltage source shall be used as the nominal voltage used by the power supply system (according to Table F.1 in GB/T 16935.1-2023 - Rated impulse withstand voltage of equipment directly powered by the mains).