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PEOPLE'S REPUBLIC OF CHINA**

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**Hydropower plant DC system technical conditions
(English Translation)**

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Foreword

This standard is based on GB/T 1.1-2009 "Guidelines for Standardization Part 1: Standard Structure and Compilation" Rules compiled.

Please note that certain contents of this document may involve patents. The issuing agency of this document is not responsible for identifying these patents.

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the Electric Power Industry Hydropower Station Automation Standardization Technical Committee.

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1 Scope

This standard specifies the function, performance, installation, test and other requirements of the DC system of hydropower plants.

This standard applies to DC power supplies for measurement, control, operation, protection, accident lighting, etc. of hydropower plants.

2 Normative references

The following documents are essential for the application of this document. For dated reference documents, only the dated version applies in this document. For undated references, the latest version (including all amendments) applies to this document.

GB/T 17478 Performance characteristics of low-voltage DC power supply equipment GB/T 19638 fixed valve-regulated lead-acid battery GB/T 19826 General technical conditions and safety requirements for DC power supply equipment in power engineering GB/T 2900.1 Basic terminology for electrical engineering GB/T 2900.41 Electrician terminology primary batteries and accumulators GB/T 2900.77 Electrotechnical terminology, electrical and electronic measurement and instrumentation-Part 1: General terminology for measurement DL/T 329 Communication interface of low-voltage power supply equipment in substation based on DL/T 860 DL/T 459 Power system DC power supply cabinet ordering technical conditions DL/T 724 Technical specification for operation and maintenance of battery DC power supply device for power system DL/T 781 High frequency switch rectifier module for power DL/T 856 DC power supply monitoring device for electric power DL/T 1392 DC power supply system insulation monitoring device technical conditions DL/T 5044 Technical Specification for Design of DC Power Supply System in Power Engineering DL/T 5186 Code for electromechanical design of hydroelectric power plants

3 Terms and definitions

Constant current charge Refers to a charging method that maintains a constant charging current within the charging voltage range.

Constant voltage charge Refers to a charging method that maintains a constant charging voltage within the range of charging current.

Constant-current limit voltage charge First charge in constant current mode, when the battery terminal voltage rises to the limit voltage value, the charging device automatically converts to constant voltage Charge until the charge is complete.

Floating charge

The charging device supplements the self-discharge charging method of the battery with a constant voltage and bears the regular load at the same time.

Equalizing charge

In order to compensate for the uneven voltage of the battery during use, it is charged with a specified constant voltage.

Supplementary charge to compensate for the capacity reduction of the battery due to self-discharge during storage or the charging after large-capacity discharge is called supplementary charging Electricity.

Constant-current discharge During the discharging process of the battery, the discharge current value remains unchanged until it reaches the specified end voltage.

Checking discharge

The battery pack in normal operation is discharged at a constant current with the specified discharge current. When one of the single cells reaches the specified discharge termination voltage is stopped, and the actual capacity is calculated based on the discharge current and discharge time, which is called verification Sexual discharge.

Current unbalance

The degree of difference in load current between charging modules. Under the condition of total output (30%~100%) rated current, press the following formula Formula calculation.

beta-current unbalance degree; I-the limit value of the output current of the measured module; IP-the average of the output current of the N working modules Value; IN-the rated current value of the module.

3.10

Insulation monitoring device for DC power system Monitor the insulation status of the DC bus of the DC system to the ground, reflect the ground resistance value of the positive and negative poles of the DC bus, and be able to locate the connection A device with functions such as on-line monitoring and alarming of the ground fault branch and calculating the ground resistance value of the fault branch.

4.1 Operating environment

4.1.1

The altitude does not exceed.2000m, and the atmospheric pressure ranges from 80kPa to 110kPa;

4.1.2

The operating environment temperature of charging screen and power feeding screen equipment is not higher than 40°C and not lower than -10°C;

4.1.3

The fixed valve-regulated lead-acid battery should be able to be used normally under the ambient temperature of -10°C~45°C (recommended the temperature is 15°C~30°C);

4.1.4

The relative humidity is 5%-95% (no condensation);

4.1.5

There is no strong vibration and impact, no explosion hazard and conductive medium in the

air, no corrosion of metals and damage to insulation the presence of harmful gases, etc.;

4.1.6

The vertical inclination of the installation should not exceed 5 degrees.

4.2 Input power requirements

4.2.1

The frequency change range does not exceed $\pm 2\%$.

4.2.2

AC input voltage fluctuation range (85%~120%) U_n .

4.2.3

The asymmetry of AC input voltage should not exceed 5%.

4.2.4

The AC input voltage should be a sine wave, and the non-sine content should not exceed 10% of the rated value.

5.1 General requirements

5.1.1

The nominal voltage of the DC system is 220V and 110V.

5.1.2

In the case of floating charge operation, the DC system bus voltage should be 105% of the nominal voltage.

5.1.3

In the case of equalizing charging operation, it shall meet.

- a) The voltage of the control bus should not be higher than 110% of the nominal voltage of the DC system;
- b) The voltage of the power bus should not be higher than 112.5% of the nominal voltage of the DC system;
- c) For the DC system where the control bus and the power bus are combined, the bus voltage should not be higher than 110% of the nominal voltage;

5.1.4

According to the needs of use, the DC system can be equipped with sub-feed screens in different areas; when the DC load power supply distance is long, an independent DC system should be configured.