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

GB/T 30547-2023

**Filter resistor for high voltage direct current (HVDC)
transmission system**

高压直流输电系统滤波器用电阻器

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Foreword

This document complies with the provisions of GB/T 1:1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting: This document replaces GB/T 30547-2014 "Resistors for High Voltage DC Transmission System Filters" and is consistent with GB/T 30547-2014 In addition to structural adjustments and editorial changes, the main technical changes are as follows:

---Changed "AC filter resistor", "DC filter resistor", "Resistor unit", "Resistance element", "Cold resistance value" and "Hot" Definition of the term "state resistance value" (see 3:1, 3:2, 3:3, 3:4, 3:10, 3:11,;2014 edition of 3:1, 3:2, 3:3, 3:4, 3:10, 3:11);

---Deleted the terms and definitions "maximum thermal resistance value" and "maximum tolerance" (see 3:12 and 3:13 of the:2014 edition);

---Added a note on the term "nominal current", added terms and definitions "maximum tolerance of resistance value", "creepage distance calculation voltage" and "thermal time": time constant" (see 3:6, 3:12, 3:14, 3:15);

---Added the usage conditions of relative humidity and seismic intensity in "normal usage conditions" (see 4:1), changed the usage conditions of pollution level (See 4:1, 4:1 of the:2014 version), and add the supplement in "Special Conditions of Use" (see 4:2);

---Deleted "Installation Conditions" (see 4:3 of the:2014 version);

---Added the calculation formula for the creepage distance of the DC filter resistor to the ground support insulator (see 5:9);

- Added special working conditions that should be considered in resistor structural design (see 6:2);
- Changed the calculation formula of withstand voltage in insulation level (see 6:3:2;:2014 version of 6:3);
- Added recommended types of pillar insulators and bushings used in different parts (see 6:5);
- The requirements for wind speed in the temperature rise test have been changed, and the regulations on test current and test procedures in the temperature rise test have been changed: The changed temperature Liter test consists of four test stages (see 7:5;:2014 version of 7:5);
- Added requirements for "heat load test" (see 7:6);
- Added "operational impulse withstand voltage test" (see 7:7:4), added "insulation resistance test" (see 7:7:5);
- Added the factory test "Appearance and General Inspection" requirements for size compliance with design drawings (see 8:3);

1 Scope

China's national standard for the resistors used in the AC and DC filters of high voltage direct current transmission systems, and the current edition of GB/T 30547, replacing the 2014 edition. It specifies the terms and definitions, the service conditions, the technical requirements, the design and construction, the type tests, the routine factory tests, the field tests, and the packaging, transport, installation, operation, maintenance and technical documentation for these resistors. An HVDC converter station is a large, deliberately non-linear load: the converter draws current in pulses, and those pulses appear as harmonic currents on the AC side and as harmonic voltages on the DC side. Filters tuned to the dominant harmonics are what keep those out of the connected networks, and the resistor is the component in the filter that determines its damping - it sets how sharply the filter is tuned, it dissipates the harmonic energy the filter captures, and it limits the transients that would otherwise circulate between the filter's own capacitance and inductance. That is an unusual duty for a resistor. It carries a continuous current made up of a fundamental component and several harmonics, it must absorb large impulse energies during switching and faults without changing value, its inductance has to be low enough not to detune the filter it belongs to, and it sits outdoors in a high voltage switchyard exposed to pollution, seismic loading and full insulation stress. The standard specifies all of that: resistance, rated frequency, maximum continuous current, inductance, insulation level, temporary current, impulse energy, temperature limits and creepage distance, with a normative annex on parameter calculation and informative annexes on design parameters and real project examples. Issued on 27 November 2023 and in force since 1 June 2024.

This document stipulates the usage conditions, technical parameters, design and structure, type testing, export of resistors for high-voltage DC transmission system filters: Factory testing, field testing, packaging, storage and transportation, installation, operation and maintenance and technical data: This document is applicable to resistors for AC filters and power for DC filters in high-voltage DC transmission systems of $\pm 1100\text{kV}$ and below: resistor:

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document:

GB/T 311:1-2012 Insulation coordination Part 1: Definitions, principles and rules

GB/T 4208-2017 Shell protection level (IP code)

GB/T 11022-2020 Common technical requirements for high-voltage AC switchgear and control equipment standards

GB/T 11604-2015 Radio interference test method for high-voltage electrical equipment

GB/T 12944 High-voltage wall-penetrating porcelain bushing

GB/T 13540-2009 Seismic requirements for high-voltage switchgear and control equipment

GB/T 16927:1-2011 High voltage testing technology Part 1: General definitions and test requirements

GB/T 25096 Definition, test methods and acceptance criteria for station pillar composite insulators for substations with AC voltage higher than 1000V

GB/T 26218:1-2010 Selection and sizing of high-voltage insulators for use in polluted conditions Part 1: Definitions, information and general principles GB/T 26218:

2 Selection and sizing of high-voltage insulators for use in polluted conditions Part 2: Porcelain and glass for AC systems glass insulator

GB 50260-2013 Code for seismic design of electric power facilities

3 Terms and definitions

The following terms and definitions apply to this document: 3:1 AC filter resistor AC filter resistor It is a device that consists of non-inductive damping resistors and related accessories, and together with components such as capacitors and reactors, forms an AC filter: 3:2 DC filter resistor DC filter resistor It is a device that consists of non-inductive

damping resistors and related accessories, and together with components such as capacitors and reactors, forms a DC filter: 3:3 resistor unit resistormodule It is an independent unit composed of multiple resistive elements, connecting materials and supporting materials assembled in a casing and having outlet terminals to form a resistor:

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