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**NATIONAL STANDARD OF THE
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**Seismic techniques for electrical equipment in converter
stations on plateaux - Part 2: Specification for seismic testing**

高原用换流站电气设备抗震技术 第2部分：抗震设计规范

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. This document is part 2 of GB/T 42558 "Seismic Technology for Electrical Equipment of Converter Stations for Plateau Use". GB/T 42558 has been published. The following parts.

1. Guidelines for seismic testing and evaluation;

2. Seismic design specifications;

3. Seismic isolation design specifications. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Electrical Equipment Industry Association. This document is under the jurisdiction of the National Plateau Electrical Products Environmental Technology Standardization Technical Committee (SAC/TC330). This document was drafted by: China Southern Power Grid Co., Ltd. Ultra-high Voltage Transmission Company Electric Power Research Institute, Tongji University, Kunming Electric Power Technology Co., Ltd. Institute of Engineering Mechanics, China Electric Power Research Institute Co., Ltd., Institute of Engineering Mechanics, China Earthquake Administration, Chongqing University, Central South University, Guangzhou University, Xi'an XD High Voltage Switchgear Co., Ltd., Shanghai Xiakai Building Technology Co., Ltd., Henan Pinggao Electric Co., Ltd., China Energy Yunnan Electric Power Design Institute Co., Ltd., China Southern Power Grid Co., Ltd., Guiyang Branch of Ultra-high Voltage Transmission Company, China Southern Power Grid Co., Ltd. Grid Co., Ltd. Ultra-high Voltage Transmission Company Dali Bureau, Haituo Instrument (Jiangsu) Co., Ltd., Guangdong Yuanguang Cable Industry Co., Ltd., China Energy Construction Group Guangdong Electric Power Design Institute Co., Ltd., China Electric Power Engineering Consulting Group Central South Electric Power Design Institute Co., Ltd., China Power Engineering Consulting Group Southwest Electric Power Design Institute Co., Ltd., Kunming High Altitude Electrical Equipment Testing Co., Ltd., Yunnan Power Grid Co., Ltd. Power Science Research Institute, Yunnan Duobao Cable Group Co., Ltd., Chongqing Guangren Energy Equipment Co., Ltd., Pinggao Group Co., Ltd., State Grid Shanghai Electric Power Company, Legend Electric (Shenyang) Co., Ltd., State Grid Sichuan Electric Power Company Electric Power Research Institute, Xi'an High Voltage Electrical Equipment Research Institute Co., Ltd., Xi'an XD High Voltage Bushing Co., Ltd., Guangxi Power Grid Co., Ltd. Electric Power Research Institute, China Southern Power Grid Kunming Branch of Ultra-high Voltage Transmission Company of China Power Grid Co., Ltd., China Southern Power Grid Research Institute Co., Ltd., Jiangsu Rugao High Voltage Electrical Equipment Co., Ltd. Co., Ltd., Hunan Changgao High Voltage Switchgear Co., Ltd., North China University of Technology, Nanjing Forestry University, South China Agricultural University, State Grid Sichuan Electric Power Co., Ltd. Ultra-high Voltage Branch, TBEA Hengyang Transformer Co., Ltd., Shenzhen Electrical Science Research Institute, Chongqing Hitachi Energy Transformer Co., Ltd., Guangzhou Siemens Energy Transformer Co., Ltd., Xi'an Xidian Transformer Co., Ltd., Huadian Electric Power Research Institute Co., Ltd., TBEA Shenyang Electric Transformer Group Co., Ltd., Shanghai Zhiheng New Energy Co., Ltd., China Southern Power Grid Co., Ltd. Ultra-high Voltage Transmission Co., Ltd. Shandong Taikai High Voltage Switchgear Co., Ltd., State Grid Shandong Electric Power Company Economic and Technological Research Institute, State Grid Sichuan Electric Power Company, Nanjing Industrial University, China Electric Power Engineering

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DC transmission is an important means to achieve high voltage, large capacity and long-distance power transmission. Due to factors such as power source location and environment, some stations Built in the plateau area, it has the characteristics of high altitude and high voltage level. Compared with the same type of electrical equipment at low altitude, it is different in structure, height, length and quality. There are obvious differences in the surface, which are reflected in being taller, longer, heavier and more flexible, and more stringent requirements are placed on the seismic performance of equipment in high seismic intensity areas. GB/T 42558 "High-altitude Converter Station" is specially formulated to provide guidance for the seismic design, modeling calculation, testing and evaluation of the electrical equipment of this type of converter station. "Seismic Technology for Electrical Equipment in Stations". GB/T 42558 is intended to consist of six parts.

- 1.Guidelines for seismic testing and evaluation. The purpose is to establish the electrical system for converter stations in high seismic intensity areas in plateaus. General requirements and evaluation principles for equipment seismic testing.
- 2.Seismic design specifications. The purpose is to specify the overall requirements for seismic design of electrical equipment for converter stations in plateaus, Seismic design of equipment, seismic design of equipment coupling connections, and seismic structural measures for equipment.
- 3.Seismic isolation design specifications. The purpose is to specify the design calculation of seismic isolation and seismic isolation of electrical equipment in converter stations for plateau use Methods, selection of shock absorbing and isolation devices, and construction requirements.
- 4.Equipment selection specification. The purpose is to guide the selection of electrical equipment in plateau converter stations and improve the resistance of electrical equipment. Shock performance.

5. Equipment operation and maintenance guidelines. The purpose is to help operators better monitor and maintain electrical equipment in high-altitude converter stations. It provides a standard basis for inspection, evaluation, maintenance and other work.

6. Technical specifications for earthquake monitoring systems. The purpose is to specify the scope of application, monitoring objects and Layout, composition and technical requirements of monitoring system, testing, installation and acceptance of monitoring system, management and maintenance of monitoring system, monitoring Storage and processing requirements for test records. Earthquake-resistant technology for electrical equipment in converter stations for plateau use Part

1 Scope

Part 2 of China's national standard for the seismic engineering of converter station electrical equipment on plateaux, covering seismic testing. A converter station is the terminal of an HVDC transmission line, and China's are frequently built at high altitude in the west, where the hydro and wind generation is - which places them in the country's most seismically active terrain. The equipment there is unusually vulnerable. Converter valves, wall bushings, transformers and the tall porcelain insulators of DC switchyards are heavy masses on slender supports, they are brittle, and their natural frequencies fall in the range that earthquake ground motion excites most strongly. Testing them means shaking full-size equipment on a table, which few facilities can do at this scale, and the specification has to fix the input motion, the mounting and the acceptance so that the test represents the plateau's seismicity rather than a generic one.

This document specifies the construction, reconstruction and expansion of electrical equipment, connections between equipment and connections between equipment and infrastructure in new, rebuilt and expanded converter stations in plateau areas. The seismic design requirements are given and the corresponding verification methods are described. This document is applicable to areas with voltage levels of $\pm 400\text{kV}$ and above, altitudes of $1000\text{m}\sim 5000\text{m}$, and seismic fortification intensity of 6 to 9 degrees Seismic design and verification of electrical equipment in converter stations. It can be used as a reference for seismic design of electrical equipment in other substation/converter station projects.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 311.1 Insulation coordination Part