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

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**Performance of high-voltage direct current (HVDC) systems --
Part 3: Dynamic conditions
(English Translation)**

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Foreword

GB/Z20996 "Performance of High Voltage DC System" is a national standardization technical document, which includes the following three parts.

Part 1. Steady state;

Part 2. Faults and operations;

Part 3. Dynamic.

This part is the third part, which is equivalent to IEC/T R60919-3.1999 "Performance of High Voltage DC System Part 3. Dynamics". Have the technical content and requirements are identical, and the editing format is in accordance with China's national standard GB/T 1.1-2000.

This part was proposed by China Electrical Equipment Industry Association.

This part is under the jurisdiction of the National Power Electronics Standardization Technical Committee (SAC/TC60).

This section is responsible for drafting units. China Electric Power Research Institute, Beijing Network United DC Transmission Engineering Technology Co., Ltd.

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Introduction

In the construction of China's power grid, HVDC transmission has a very broad development prospect for long-distance power transmission and large-area networking.

An important means to solve high voltage, large capacity, long distance power transmission and asynchronous networking. According to the actual needs of China's HVDC project and high voltage straight the development of the trend of the power transmission technology is based on the digestion and absorption of imported technologies, the construction experience of domestic DC transmission projects and the independent development of equipment.

On the basis of research, the national standard system for HVDC transmission equipment was developed. Content includes basic standards, master equipment standards, and control and protection equipment standard. The project has completed or is in the process of developing a total of 19 national standards.

(1) "The first part of the performance of the high-voltage DC system" (2) "The second part of the performance and performance of the high-voltage DC system" (3) "The third part of the performance of high-voltage DC system" (4) "Insulation coordination procedure for HVDC converter station" (5) "Determination of loss of high-voltage DC converter station" (6) "Conversion transformer for the second part of high-voltage direct current transmission" (7) Technical parameters and requirements for oil-immersed converter transformers for HVDC transmission (8) "Oil-immersed smoothing reactor for HVDC transmission" (9) Technical parameters and requirements for oil-immersed smoothing reactors for HVDC transmission (10) "Guidelines for Non-Gap Metal Oxide Arresters for HVDC Converter Stations" (11) "Parallel capacitors and AC filter capacitors for HVDC transmission" (12) "DC Filter Capacitor for HVDC Power Transmission" (13) "General requirements for ordinary thyristors for HVDC transmission" (14) "Test of Thyristor Valves for Power and Electronic Technology Static Reactive Power Compensation Devices for Transmission and Distribution Systems" (15) "HVDC power transmission system control and protection equipment" (16) "High-voltage DC converter station noise" (17) "High-voltage DC bushing technical performance and test methods" (18) "General Requirements for Photo-Controlled Thyristors for HVDC Transmission" (19) "Guidelines for DC System Research and Equipment" GB/Z20996.3-2007/IEC/TR60919-3:1999 High-voltage DC system performance Part 3. Dynamic

1 Scope

This part of GB/Z20996 provides comprehensive guidelines for the dynamic performance of high voltage DC systems. The dynamic performance in this section refers to its special features.

The frequency or time region covers events and phenomena ranging from transient conditions to steady state conditions. The dynamic performance it relates to should be stable Under the transient or transient conditions, the high-voltage direct current transmission system at both ends and the connected AC system or its components, such as power plants, AC lines and busbars, reactive power sources the interaction between the

two. The high-voltage direct current transmission system at both ends adopts a 12-pulse (wave) converter consisting of three-phase bridge wiring (dual) the component is composed of two-way power transmission capability. The inverter is made of a thyristor valve that is insulated and fitted by a gapless metal oxide arrester.

For the bridge arm. Diode converter valves are not considered in this section. For the multi-terminal HVDC transmission system, although not specifically mentioned, but in this section Multiple content is also available for multi-end systems.

GB/Z20996 consists of three parts. Part 1 is steady state, Part 2 is fault and operation, Part 3 is dynamic. In the development and editing During the writing process, it has been avoided to repeat the three parts. Therefore, when the user prepares to prepare the specifications of the high-voltage DC system at both ends, Test the entire contents of the three parts.

Pay attention to the differences between system performance specifications and equipment design specifications for each component in the system. This section does not specify equipment technology the technical conditions and test requirements, but focus on those technical requirements that affect the performance of the system. This section also does not include detailed seismic performance requirements.

begging. In addition, there may be many differences between different HVDC systems. This section does not discuss this in detail. Therefore, this section should not Directly used as a technical specification for a specific engineering project. However, based on this, the specific transmission system can be programmed to meet the actual system.

Technical specifications required by the system. The content covered in this section does not distinguish between the responsibility of the user and the manufacturer.

2 Normative references

The terms in the following documents become the provisions of this part by reference to this part of GB/Z20996. All dated references Documents, all subsequent amendments (not including errata content) or revisions do not apply to this section. However, encouragement according to this section the parties to the agreement study whether the latest versions of these documents can be used. For undated references, the latest edition applies to this section.

GB/Z20996.1-2007 High-voltage DC system performance Part 1. Steady state (IEC/T R60919-1.1988, IDT) GB/Z20996.2-2007 High-voltage DC system performance Part 2. Faults and operation (IEC/T R60919-2.1991, IDT)

3.1 Dynamic Performance Specification

The complete dynamic performance specification for HVDC systems should include the following sections.

- AC system flow and frequency control (see Chapter 4);
- AC dynamic voltage control and interaction with reactive sources (see Chapter 5);
- Transient and static stability of the AC system (see Chapter 6);
- Dynamic performance of high voltage DC systems at higher frequencies (see Chapter 7);
- Second synchronous oscillation (see Chapter 8);
- Interaction with power plants (see Chapter 9).

Chapter 4 deals with the use of active power control of high-voltage DC systems to influence the flow and/or frequency of associated AC systems to improve the AC system.

Performance. The following points should be considered when designing the HVDC active power control mode.

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