

ICS 29.200
CCS L 43

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

DL/T 2042-2019

**Technical specification for HVDC thyristor level test equipment
(English Translation)**

Issued on: June 4, 2019

Implemented on: October 1, 2019

Issued by: National Energy Administration

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the High Voltage Direct Current Transmission Technology Standardization Technical Committee of the Power Industry.

Drafting organizations of this standard. State Grid Corporation of China, Xuji Group Co., Ltd., Xi'an Jiaotong University, State Grid Corporation of China Global Energy Internet Research Institute Co., Ltd., China Power Technology Equipment Co., Ltd.

1 Scope

This standard specifies the terms and definitions, use environmental conditions, and technical parameters of HVDC converter valve thyristor-level test devices and the basic requirements of performance, inspection rules, product identification, packaging, transportation and storage.

This standard applies to thyristor-level test devices for converter valves of DC transmission systems with voltage levels of $\pm 1100\text{kV}$ and below. The device is generally used Factory test at the thyristor level of the converter valve, routine maintenance in the station and diagnostic test.

2 Normative references

The following documents are indispensable for the application of this standard. For dated reference documents, only the dated version applies to this file. For undated references, the latest version (including all modifications) applies to this document.

GB/T 2887-2011 General Specification for Computer Site GB/T 4208-2017 Enclosure protection grade (IP code) GB/T 7268 The basic size series of plug-in boxes and plug-in panels for power system protection and automation equipment GB/T 9174-2008 General technical requirements for general cargo transportation packaging GB/T 11287-2000 Electrical Relay Part 21: Vibration, Shock, Impact and Seismic Test of Measuring Relays and Protection Devices Test Part 1: Vibration Test (Sine) GB/T 14537-1993 Impact and collision test for measuring relays and protection devices GB/T 14598.27-2008 Measuring Relays and Protection Devices Part 27: Product Safety Requirements GB/T 19520.12 Mechanical Structure of Electronic Equipment 482.6 mm (19 in) Series Mechanical Structure Dimensions Part 3-101.Sub-box and Plug-in

3 Terms and definitions

The following terms and definitions apply to this document.

Thyristor level

A valve component composed of a single thyristor stage, a damping circuit and a control unit directly connected to it (see Figure 1).

Figure 1 Schematic diagram of thyristor stage

Low-voltage test of thyristor level Thyristor-level tests with test voltages less than 1000V include short-circuit test, impedance test, trigger test, etc.

High-voltage test of thyristor level Thyristor-level tests with test voltages greater than 1000V, including forward protection trigger test, recovery period protection trigger test, reverse resistance Pressure test, etc.

Short circuit test

A test to determine whether the thyristor stage is short-circuited.

Impedance test

Test to measure the impedance of thyristor-level components.

Firing test

A test to determine whether the conventional trigger function of the thyristor level is normal.

Protective firing test A test to determine whether the protective trigger function of the

thyristor level is normal when subjected to a forward overvoltage.

Recovery protection firing test A test to determine whether the thyristor-level recovery period protection trigger function is normal.

Reverse withstand voltage test Judge whether the reverse impulse voltage performance of the thyristor level meets the design requirements.

4.1.1 Ambient conditions for normal work

The environmental conditions for the normal working of the equipment are.

- a) Ambient temperature. $-10^{\circ}\text{C}\sim 55^{\circ}\text{C}$;
- b) Relative humidity. 5%~95%;

4.1.2 Other requirements of the use environment

The equipment use environment should meet the following requirements.

- a) Vibration that exceeds the severity level 1 specified in GB/T 11287-2000 should not occur;
- b) There is a reliable grounding point, and the grounding resistance should meet the requirements of 4.4 in GB/T 2887-2011.

4.2.1 Insulation resistance

When the device is subjected to insulation resistance test under standard atmospheric conditions, the following requirements shall be met.

- a) The power input of the device is tested with a 500V insulation resistance meter against the metal shell, and the insulation resistance should not be less than 100Mohm.
- b) The power input and voltage output of the device are tested with a 500V insulation resistance meter, and the insulation resistance should not be less than 100Mohm.

4.2.2 Medium strength

- a) The power input of the device can withstand a DC test voltage of 3kV to the metal casing for 1 minute, and the leakage current is not more than 5mA Withstand voltage test without insulation breakdown or flashover.
- b) The power output circuit of the device can withstand a DC test voltage of 10kV to the metal shell, which lasts for 1 minute, and the leakage current is not large in the 5mA withstand voltage test, there is no insulation breakdown or flashover.

4.2.3 Impulse voltage

- a) The power input of the device should be able to withstand an impulse voltage with a standard lightning peak value of 5kV to the ground without insulation breakdown or flashover the phenomenon appears.
- b) The voltage output circuit of the device should be able to withstand the impulse voltage of the standard lightning wave with a peak value of 10kV to the ground without insulation breakdown or the flashover phenomenon appears.

4.3.1 Vibration (sinusoidal)

The device shall have the ability to withstand the vibration response and durability of the severity level 1 specified in 3.2.1 of GB/T 11287-2000.

4.3.2 Impact

The device shall have the ability to withstand the impact response and durability of the severity level 1 specified in 4.2.1 of GB/T 14537-1993.

4.3.3 Collision

The device should have the ability to withstand the impact of the severity level 1 specified in 4.3 of GB/T 14537-1993.

4.4 The influence of power supply the working power supply of the device should be able to work reliably when the power supply voltage range of AC220 (-15%~10%) V is changed. Performance parameters Meet the requirements of this standard.

4.5.1 Chassis and plug-in dimensions

The size of the chassis and plug-in unit of the device should meet the requirements of GB/T 7268 and GB/T 19520.12.

4.5.2 Surface coating

The color coated on the surface of the device should be uniform, without obvious color difference and glare, and the surface should be free of defects such as sand particles, wrinkles and flow marks.

4.5.3 Plug-in performance

The plug-in unit in the device should have a locking mechanism, which is flexible in insertion and removal and good interchangeability.