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

DL/T 1131-2019

Replacing DL/T 1131-2009

**System Test Standard for ±800kV HVDC Project
(English Translation)**

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Foreword

This standard is in accordance with the rules given in the national standard GB/T 1.1-2009 "Standardization Guidelines Part 1: Standard Structure and Compilation" Drafting.

This standard is a revision of DL/T 1131-2009 "±800kV HVDC Transmission Engineering System Test Regulations", and is in line with the previous version of the standard in comparison, the main technical differences are as follows.

-Added DC bias test;

-Added ±800kV DC unipolar dual converter layered access system test.

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 DC Construction Branch, China Electric Power Research Institute Co., Ltd., China Southern Power Grid Research Institute Co., Ltd.

1 Scope

This standard specifies the items, requirements and acceptance criteria for system testing of ±800kV HVDC transmission engineering.

This standard is applicable to bipolar ±800kV HVDC transmission projects where power can be transmitted in both directions and each station contains two 12-pulse converters in series.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document.

For undated references, the latest version (including all amendments) applies to this document.

GB/T 13498 Terminology for HVDC Transmission DL/T 1130-2009 HVDC transmission engineering system test regulations GB 50150 Electrical equipment installation engineering electrical equipment handover test standard DL/T 1129 DC converter station secondary electrical equipment handover test procedures

3.1 Terminology semantics

3.1.1

Converter station system test Refers to the completion and qualification of the sub-system test, the relevant primary equipment of the converter station has the electrified conditions, in accordance with the contract and technical specifications According to the requirements of the book, the test of converter station functions shall be checked in each converter station, namely, converter station equipment charging, sequence control function, DC line opening Road tests, etc., are also preparations for end-to-end system tests.

3.1.2

End to end system test Refers to verifying that the overall function of the entire DC transmission system meets the requirements of the functional specification based on the completion and qualification of the station system Performance indicators and tests to verify the joint operation performance of AC and DC systems.

3.1.3

Bypass breaker

Refers to a circuit breaker connected in parallel to the high and low voltage ends of the 12-pulse converter unit.

3.1.4

Bypass disconnecter

Refers to the isolation switch connected in parallel to the high and low voltage ends of the 12-pulse converter unit.

3.1.5

Disconnecter for connection with DC Bus Respectively on the high-voltage side and low-voltage side of the 12-pulse converter, in series with the isolation knife between the

bypass circuit breaker and the bypass isolation switch connection point brake.

3.1.6

Hierarchical access

Refers to a converter station with a very high and low-end converter connected to the AC grid of different voltage levels.

3.2 Symbols, codes and abbreviations

The following symbols, codes and abbreviations apply to this document.

SVC. Static voltage compensation CPU. Central Processing Unit Qref. Reference value of reactive power exchange between converter station and AC system Qex. The amount of reactive power exchange between the converter station and the AC system Q. The reactive power adjustment dead zone set by the control software Uref. Voltage reference value Uac. AC bus voltage of converter station U. is the voltage regulation dead zone set by the control software Udm. Voltage between the connection point of one pole two series converter and the bottom of the low-end converter

4 General

4.1

The engineering system test shall be carried out before the DC transmission project is put into commercial operation.

4.2 $\pm 800\text{kV}$ DC transmission engineering system test shall be based on approval documents, engineering technical specifications, design drawings, procurement contracts, construction contracts, the engineering test plan and the regulations, standards, norms and procedures promulgated by the national and industry authorities required by it are the basis.

4.3

The scope of the station system test project mainly includes sequential operation test, outlet trip test, converter transformer and converter charging test, DC Line open circuit test, anti-interference test, station power switching test, zero power test, etc.; the order of each test item should be in accordance with the following clauses.

In order. The AC field charging test can be carried out in the station system test or separately.

4.4

The project scope of the end-to-end system test includes the following.

a) Refers to the test content of the DC system within the operating range allowed by the

design and the site conditions, usually including single pole low power Four parts. rate test, single maximum power test, bipolar low power test, and double maximum power test; the order of each test item should be in accordance with the order of the subsequent clauses, and when the engineering and system conditions permit, try to combine the bipolar test project.

b) During the end-to-end system test, the steady-state data at both ends, as well as the dynamic and transient process AC and DC system (including equipment) dynamic response characteristics, overvoltage, harmonic performance, converter station noise, radio interference, Tracking and monitoring of electromagnetic interference, grounding electrode status, etc.; the functions and performance indicators of the system and equipment should meet the requirements of technical specifications begging. After the end-to-end system test project is completed, the DC transmission project can be put into commercial operation.

4.5

The special requirements in the system test of DC transmission engineering are as follows.

- a) For the special functions/performance required by certain $\pm 800\text{kV}$ DC projects, corresponding test items should be added according to the technical specifications of the project.
- b) The test items specified in this regulation, unless otherwise specified, can be specified to be carried out in any wiring operation mode within the design. For the and the test of step-down operation is carried out under the connection mode of dual 12-pulse converters for each pole.

4.6

The engineering system test specified in this standard shall be carried out after the equipment test and sub-system test of the corresponding part of the converter station are completed and passed the acceptance.

OK; the final system test scope of the project is subject to the test plan approved by the project start-up committee.

5-station system test

5.1 Preparation and requirements for station system test

5.1.1

The converter station shall meet the following conditions before the station system test.

- a) The auxiliary power system of the station has the power supply conditions.
- b) The AC switchyard has the live condition.
- c) All equipment and facilities in the construction project and production area related to the