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

DL/T 1015-2019

Replacing DL/T 1015-2006

**Guide for application of voltage measuring system in DC&AC
high voltage tests on site
(English Translation)**

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Foreword

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

This standard is a revision of DL/T 1015-2006 "Guidelines for the Use of Field DC and AC Withstand Voltage Test Voltage Measurement System".

The content to be revised is as follows.

- Update the normative references;
- Add "Terms and Definitions" clause;
- According to GB/T 16927.3-2010, revise the corresponding chapters of the standard;
- Increase the applicable voltage measurement range of the high-voltage electrostatic voltmeter;

- Delete the "ball gap measurement method" in the "on-site AC withstand voltage test measurement system";
- Delete "Verification method with capacitor voltage divider and digital storage oscilloscope" in "Verification of AC test voltage waveform";
- Fix the "error caused by the electric field of the conductor with AC voltage on site" and the "error caused by the parasitic capacitance of the series high voltage capacitor" Replaced with "measurement error caused by live conductor";
- Modify the factors affecting the measurement error;
- Modify the estimation method of measurement error in Appendix A.

After the implementation of this standard, it will replace DL/T 1015-2006.

This standard was proposed by the China Electricity Council.

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

The organization responsible for drafting this standard. State Grid Hubei Electric Power Co., Ltd. Electric Power Research Institute, Wuhan University School of Electrical Engineering Participated in the drafting of this standard. North China Electric Power Research Institute Co., Ltd., Suzhou Huadian Electric Technology Co., Ltd.

Drafters of this standard. Zhang Zhi, Wang Yongqin, He Jiahui, Tong Xin, Wang Jianguo, Cai Wei, Guo Shouxian, Wu Tong this standard was first released on September 14, 2006, and this is the first revision.

The opinions and suggestions during the implementation of this standard are fed back to the Standardization Management Center of China Electricity Council (Baiguang Road, Xicheng District, Beijing) Er Tiao No. 1, 100761).

Guidelines for the use of field DC and AC withstand voltage test voltage measurement systems

1 Scope

This standard specifies the requirements for the use of on-site DC and AC withstand voltage test and measurement systems.

This standard applies to DC high voltages in power plants, substations, etc., as well as power equipment manufacturers, repair shops, and laboratories.

And AC high voltage test.

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

GB/T 16927.3-2010 High Voltage Test Technology Part 3: Definition and Requirements of Field Test

3 Terms and definitions

The following terms and definitions apply to this document.

On-site test

In the test conducted at the place where the electrical equipment to be tested and the facility are used, the equipment should be as consistent as possible in the operating state.

Measuring system

A complete set of devices suitable for AC and DC high voltage measurement.

4.1 Requirements for DC test voltage measurement system

An effective traceable measurement system shall be used for measurement and shall meet the requirements of GB/T 16927.3-2010. The test voltage value shall be measured (arithmetic the total uncertainty of the average) does not exceed 5%. If there is ripple and the ripple factor is less than 3%, these uncertainty limits should not be exceeded.

Note: The total uncertainty refers to the combined result of each measurement uncertainty component measured on site.

4.2.1 General principles

The on-site DC withstand voltage test voltage measurement system generally includes.

- a) Measuring system with high resistance resistor in series with DC microammeter;
- b) Measuring system of resistance voltage divider and low voltage voltmeter;
- c) High-voltage electrostatic voltmeter.

4.2.2 Measuring system with high resistance resistor and DC microammeter in series

Figure 1 shows the principle wiring diagram of the measurement system with a high-resistance resistor in series with a DC microammeter.

The resistance value of the resistor should be stable, choose its resistance value according

to the working current of 0.5mA~1mA, and check the resistance under the working current the power loss must not exceed the rated power of the resistor.

The insulating sleeve of high resistance resistor should not be divided into sections. The high potential end should be equipped with a voltage equalization device, and the low potential end should be equipped with a shielding device.

The external insulation of high resistance resistors should not flashover along the surface during voltage measurement. The field strength of the effective insulation length on the surface of the insulation cylinder can be 150kV/m design. When the altitude of the place of use exceeds 1000m, the design should be based on the actual altitude.

4.2.3 Measuring system of resistance divider and low voltage voltmeter

The principle wiring diagram of the measuring system composed of resistance divider and low voltage voltmeter is shown in Figure 2.

The resistance value of the resistor divider should be stable and the voltage division ratio should be accurate. The selection of high-voltage arm resistance of resistance divider and 4.2.2 medium and high resistance resistors the selection requirements are the same.

The input resistance of the low-voltage voltmeter connected in parallel with the resistance of the low-voltage arm of the resistor divider should not be less than 100 of the resistance of the low-voltage arm of the voltage divider Times. Low-voltage voltmeter can choose electrostatic voltmeter or digital voltmeter.

The low-voltage arm resistance R_2 contains the input resistance value of the low-voltage voltmeter. If the low-voltage voltmeter uses an electrostatic voltmeter or a high-power for digital voltmeters with input resistance, the influence of its input resistance on the voltage divider ratio of the resistance divider can be ignored.

4.2.4 High-voltage electrostatic voltmeter

When the test voltage is not higher than 30kV, an electrostatic voltmeter can be used for on-site measurement.

The high-voltage electrostatic voltmeter is an instrument that directly measures the effective value of the voltage. When the ripple factor S of the measured DC voltage is not greater than 3%, use Use a high-voltage electrostatic voltmeter to measure the DC voltage. At this time, the indicated value of the electrostatic voltmeter can be used as the average value of the measured DC voltage.

When using a high-voltage electrostatic voltmeter to measure the DC test voltage, you should check in advance whether the components of the high-voltage electrostatic voltmeter are normal and the insulation Whether the surface of the pillar is clean and dry, there should be no wind and no ion current at the test site.