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DL

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

DL/T 1000.1-2018

**Application guide of insulators for overhead lines with a
nominal voltage over 1000V - Part 1: Ceramic or glass
insulators for a. c. systems
(English Translation)**

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1 Scope

This standard specifies the general technical requirements, selection principles, inspection, acceptance, on-site storage and transportation, installation and operation and maintenance of AC overhead line insulators which have a nominal voltage higher than 1000 V.

This standard applies to disc-shaped suspended porcelain and glass insulators (hereinafter referred to as insulators) for AC overhead power lines, power plants, substations, which have a nominal voltage higher than 1000 V and a frequency of 50

Hz. The installation site is below 1000 m above sea level; the ambient temperature is between -40 °C ~ +40 °C.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document;

for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 311.1 Insulation coordination - Part 1: Definitions, principles and rules

GB/T 772 High-voltage insulator porcelain parts - Technical conditions

GB/T 1001.1 Insulators for overhead lines with a nominal voltage above 1000V -

Part 1: Ceramic or glass insulator units for a.c. systems - Definitions, test methods and acceptance criteria

GB/T 2900.5 Electrotechnical terminology - Electrical insulating solids, liquids and gases

GB/T 2900.8 Electrotechnical terminology - Insulators

GB/T 7253 Insulators for overhead lines with a nominal voltage above 1000 V -

Ceramic or glass insulator units for a.c. systems - Characteristics of insulator units of the cap and pin type

GB/T 16927.1 High-voltage test techniques - Part 1: General definitions and test requirements

GB/T 20642 Impulse puncture test in air on insulators for overhead lines

GB/T 24623 Radio interference test on high-voltage insulators

GB/T 25318 Locking devices for ball and socket couplings of string insulator units

- Dimensions and tests

GB/T 26218.1 Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles

DL/T 626 Testing procedures of degradation of suspension insulator

JB/T 4307 Cement mortar for insulators

JB/T 8177 The hot dip galvanized coating of metallic parts for insulators general technical specification

JB/T 8178 Technical specification of cap for cap and pin insulators

JB/T 9677 Steel pins of cap and pin insulators

JB/T 9678 Appearance quality of toughened glass insulator bodies for cap and pin insulators

3 Terms and definitions

The terms and definitions defined in GB/T 2900.5, GB/T 2900.8, GB/T 1001.1 apply to this document.

4.1 Component characteristics

The characteristics of insulator components shall comply with the provisions of GB/T 7253.

4.2.1 Porcelain components

Porcelain components shall meet the following requirements:

- a) The appearance quality of porcelain components shall comply with the provisions of GB/T 772 and GB/T 1001.1. They shall not have warping, cracks, sand holes, shrinkage crimping or any other process with more than one piece of material.
- g) The iron cap of the insulator shall not touch the upper surface of the insulating part; the iron cap, insulator, steel foot are on the same axis.
- h) The iron cap and steel foot of the insulator, which has a strength level of 160 kN and above, shall be tested by flaw detection one by one.

4.4 Locking pin

The locking pin shall meet the following requirements:

- a) The locking pin shall comply with the provisions of GB/T 25318 and GB/T 1001.1.
- b) The locking pin shall be made of stainless steel; the material shall not have an anti-corrosion surface layer. To prevent leakage, the size of the bent part at the end of the pin leg shall meet the provisions of GB/T 25318.
- c) Insulators with strength levels of 160 kN and above shall use R-type pins. The R- type pin shall have two separate ends, to prevent it from completely falling out of the ball socket when it is locked and connected.
- d) Special tools shall be used to assemble the locking pin, to avoid damaging the galvanized layer of the metal accessories.

4.5 Cement adhesive

Cement adhesive shall meet the following requirements:

- a) Insulators shall be glued with silicate cement of strength grade 42.5 (R) or above, or adhesive prepared with specially made high-strength low-expansion aluminate cement.
- b) After the cement adhesive is cured, the iron cap and steel foot of the insulator shall not be loose.
- c) The cement adhesive shall completely fill the gap between the insulating part and the metal part and eliminate bubbles.
- d) The autoclave expansion rate of the cement adhesive shall not exceed 0.10%.
- e) The cement adhesive shall not chemically react with metal accessories.
- f) The flatness of the exposed surface of the cement adhesive shall not exceed 2 mm,

meanwhile there shall be no cracks or damage.

g) The prepared cement adhesive shall comply with the provisions of JB/T 4307.

The manufacturer shall provide a type test report and a sampling test report, that the cement adhesive complies with the relevant standards.

Note: The steel foot can be considered as loose, when the horizontal rotation angle is not greater than 3°.

4.6 Deterioration rate (self-explosion rate) of insulators

If the average annual degradation rate (self-explosion rate) of the insulator from installation to commissioning exceeds 0.04%, it is necessary to analyze the cause and take corresponding measures.

The average annual degradation rate (self-explosion rate) of the insulator shall not be greater than 0.04%, within 2 years after commissioning; the average annual degradation rate (self-explosion rate) shall not be greater than 0.02% during the inspection cycle after 2 years, OR the annual degradation rate (self-explosion rate) shall not be greater than 0.1%.

Note: Experience shows that nickel sulfide homogenization treatment of glass parts is an effective measure to reduce the self-explosion rate.

5.1 General principles

The selected insulators shall have mature technology, advanced process, reliable quality, operating experience; follow the following principles:

- a) Comprehensively consider the purpose of safe, stable, economical, high-quality power supply of the power grid.
- b) The insulator has a type test report provided by a qualified inspection organization.
- c) The new product has a successful supply record of not less than 1 year of trial operation and not less than 2000 trial operation units.
- d) The mechanical strength of the insulator shall be compatible with the design and operation requirements of transmission lines of different voltage levels and shall be selected in accordance with GB/T 7253.
- e) The pollution characteristics of different types of insulators shall be compared according to the voltage level, operating conditions, use environment; it shall give priority to the insulators, which have high pollution withstand voltage, excellent pollution accumulation characteristics, self-cleaning characteristics under unit structural height.
- f) When the insulator is used at an altitude of more than 1000 m, its external insulation shall be corrected for altitude according to the provisions of GB/T