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

DL/T 1000.3-2015

**Application guide of insulators for overhead lines with a
nominal voltage over 1000V - Part 3: Composite insulator for
a.c. system**

(English Translation)

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1 Scope

This Part specifies the general technical requirements, selection principles, inspection, storage and transportation, acceptance and installation, daily inspection and maintenance, technical management of rod-shaped suspension composite insulators for

AC overhead lines, which have a nominal voltage higher than 1000 V.

This Part applies to composite insulators (referred to as composite insulators) for AC overhead power lines, which have a nominal voltage higher than 1000 V and a frequency of 50 Hz, as well as power plants and substations. The installation site is below 1000 m above sea level; the ambient temperature is between -40 °C ~ +40 °C.

This Part includes requirements for selecting composite insulators according to specific operating conditions.

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 311.1 Insulation co-ordination - Part 1: Definitions, principles and rules

GB/T 311.2 Insulation co-ordination - Part 2: Application guide

GB/T 4585 Artificial pollution tests on high-voltage insulators to be used on a.c. systems

GB/T 19519 Insulators for overhead lines - Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1000 V - Definitions, test methods and acceptance criteria

GB/T 21421.1 Composite string insulator units for overhead lines with a nominal voltage greater than 1000 V - Part 1: Standard strength classes and end fittings

GB/T 21421.2 Composite string insulator units for overhead lines with a nominal voltage greater than 1000 V - Part 2: Dimensional and characteristics

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

GB/T 26218.2 Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for a.c. systems

GB 50545 Code for design of 110 kV ~ 750 kV overhead transmission line

DL/T 368 The correction of high altitude on pollution external insulation for insulators used in transmission line

DL/T 376 General technical requirements of silicone rubber insulation materials for composite insulators

DL/T 741 Operating code for overhead transmission line

DL/T 859 Artificial pollution tests on composite insulators used on high-voltage AC systems

DL/T 1122 Technical guide of insulation coordination selection for overhead transmission line

DL/T 1474 Hybridity measuring method of composite insulator for AC and DC overhead lines with a normal voltage greater than 1000 V

JB/T 11219.1 End fitting for composite insulator with a high voltage overhead line.

Part 1: End fitting for string insulator units

3 Terms and definitions

The following terms and definitions as defined in GB/T 19519 are applicable to this document.

3.1

Uniformity voltage fitting

A device installed on the metal accessories, which can firstly improve the potential distribution of the composite insulator, protect the metal accessories, core rods and sheds from arc burns, secondly protect the connection areas of the metal accessories at both ends from damage to the sealing performance due to leakage tracking and erosion. The uniformity voltage fitting can be a uniformity ring, a uniformity arc starter ring or a semiconductor polymer device.

3.2

level of the composite insulator after installing the designed uniformity voltage fitting shall not exceed 500 μV , at the specified 1.1 times the maximum operating phase voltage (, where U_m is the maximum operating voltage).

4.6.3 Artificial pollution power frequency withstanding performance

Composite insulators shall meet the requirements of artificial pollution power frequency withstanding voltage test. A test voltage of is applied to the composite insulator, to withstand the given test salt density (SDD) and ash density (NSDD). The test procedure and criteria are carried out in accordance with GB/T 4585 and DL/T 859.

4.6.4 Power frequency arc performance

Composite insulators shall meet the requirements of power frequency arc test. The design of the end accessories of composite insulators shall take into account the influence of arc. The short-circuit current and duration may cause damage to the end accessories, core rods, sheds; appropriate arc protection devices shall be designed.

4.7.1 Rated mechanical tensile load level

The rated mechanical tensile load of composite insulators should be selected from the following levels: 70, 100 (120), 160, 210, 300, 400 (420) kN, 530 (550) kN. The strength grades outside the brackets shall be preferred.

4.7.2 Test load

For newly put into operation composite insulators which have voltage levels of 330 kV and above, the average value of the mechanical destructive load minus 3 times the standard deviation shall not be less than the rated mechanical tensile load (SML).

Note: For special projects, for example, composite insulators with strength grades of 300 kN and above used in 750 kV and above UHV projects should also withstand for 24h without damage under 1.2 SML.

If the composite insulator is subjected to obvious compression, torsion, bending and other forces during use, the test method and test load shall be determined by negotiation between the supplier and the buyer.

5.1 General principles

In the newly-built, expanded, rebuilt power transmission and transformation projects, the selection of composite insulators shall follow the principle of "mature technology, advanced process, reliable quality and operating experience". Before new products are used in batches, they must pass the type-finalization test; the trial operation time shall not be less than 1 year.

The annual damage rate of operating composite insulators shall be less than 0.05%.

5.2 Unified specific creepage distance (USCD) and creepage factor

Under general regional environmental conditions, the unified specific creepage distance (USCD) and creepage factor of composite insulators shall meet the requirements of

GB/T 26218.1, GB/T 26218.2, DL/T 1122.

For composite insulators used in special areas (such as high dust pollution areas, heavy pollution areas, heavy ice areas, etc.), if they are restricted by conditions such as structural height, the creepage factor (CF) can be determined by negotiation between the supplier and the buyer.

5.3 Uniformity voltage fitting

a) The uniformity voltage fitting shall be designed to control the field strength at the end of the composite insulator within 4 kV/cm. It can be appropriately relaxed in special circumstances, but the maximum shall not exceed 5 kV/cm.

Note: The field strength at the end of 1000 kV UHV composite insulators should be controlled within 5 kV/cm.

b) For composite insulators with double-section structure, the middle connection part shall be equipped with a uniformity voltage shielding device that meets the relevant technical requirements of field strength control and anti-corona.

c) The material of the uniformity voltage fitting should be aluminum alloy; it shall have sufficient mechanical strength. The pipe diameter, ring diameter, shielding depth of the uniformity voltage ring shall meet the relevant technical requirements of field strength control and anti-corona.

d) The uniformity voltage fittings at the high-voltage end and the grounding end shall meet the requirements of the power frequency arc for composite insulators.

e) When designing the uniformity voltage fitting, the installation position of the uniformity voltage fitting shall be unique.

f) Whether to use the bird-proof uniformity voltage fitting is determined by the purchaser.