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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 24622-2022

Guidance on the measurement of hydrophobicity of insulator surfaces

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foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1.Structure and Drafting Rules of Standardization Documents"

drafted.

This document replaces GB/T 24622-2009 "Guidelines for the measurement of surface wettability of insulators". Compared with GB/T 24622-2009,

In addition to structural adjustments and editorial changes, the main technical changes are as follows.

--- Use the term "hydrophobicity" instead of "wetting", "hydrophobicity grade (HC)" instead of "wetting grade (WC)" (see 3.1 and 3.5,

2.1 and 2.6 of the.2009 edition);

--- In "3 Terms and Definitions", only the term "surface tension" is retained, the term "interfacial tension" is deleted, and part of the content is changed to

Notes to this term (see 3.3, 2.3 of the.2009 edition);

--- Deleted "recommended value of 50 μL" (see 3.2.3.1);

--- Modify "the ratio between length and width should not be greater than 1.3" in 4.4.3 to "the ratio between length and width should not be greater than 3.1"

(See 4.4.3, 3.4.3 of the.2009 edition);

--- Changed the corresponding value between the back contact angle and the hydrophobicity grade in the criteria for determining the hydrophobicity grade (HC) in Table 1 (see Table 1).

This document is modified and adopted IEC TS62073.2016 "Guidelines for Measurement of

Hydrophobicity of Insulator Surfaces", and the document type is based on IEC technical specifications.

Adjusted to my country's national standard.

This document adds a chapter "Normative References".

The technical differences between this document and IEC TS62073.2016 and their reasons are as follows.

---Although different droplet volumes need to be selected according to the corresponding surface state, IEC TS62073.2016 3.2.3.1 "recommended

The value of 50 μL" is not in line with the actual situation, therefore, in 4.2.3d) of this document, the "recommended value of 50 μL" is deleted to adapt to our country

specific situation;

--- In 4.4.3, "the ratio between length and width should not be greater than 1.3" is revised to "the ratio between length and width should not be greater than 3.1".

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

The water-wetting properties of a surface are generally described by the terms hydrophobic (or hydrophobic) and hydrophilic (or hydrophilic). A hydrophobic surface is water repellent,

In contrast, surfaces with high surface tension surface states that are easily wetted by water are hydrophilic.

Surface wetting is complex and affected by many different parameters. Some important parameters include. insulator material type, surface roughness,

Surface inhomogeneity, chemical composition (eg, due to ageing) and the presence of contamination. Some commonly used materials for insulators are affected by the surrounding conditions.

Its hydrophobicity will change with time. This change can be reversible or irreversible. Therefore, the measurement results of hydrophobicity can be

Energy can be affected by ambient conditions and high voltage corona, as well as dry band caused by pre-existing arcing on the insulator. Dynamics of different insulator materials

State hydrophobicity is more or less different.

The materials of insulators exhibit different dynamic wetting characteristics due to their different chemical compositions. Different processes, e.g. oxidation, hydrolysis, low molecular weight

migration of chemical compounds, formation of complexes such as between siloxane and water, rotation of flexible polymer chains, inter- and intra-molecular rearrangements,

Microbial growth, deposition of contaminants, attachment and coating of contaminant particles, etc. occur at different rates and depend on the material and surrounding conditions.

pieces. Due to different exposure conditions such as sunlight, rain, corona discharge, pollutant deposition, etc., the hydrophobicity of each position on the insulator will be different.

different. Therefore, the insulator hydrophobicity measurement is usually carried out in different areas of the insulator.

The laboratory uses specially prepared samples to measure the surface hydrophobicity. The surfaces of these samples should be uniform, smooth and flat for easy measurement. to the actual

Insulators, this measurement is made without destroying the insulator (cutting the material sample is generally not desired). This measurement condition is not complete, because

And high-precision measurement is a challenge. Especially for insulation installed on overhead lines, substations, and even high-voltage test equipment in the laboratory

measurement is more difficult.

Guidelines for Measuring Hydrophobicity of Insulator Surfaces

1 Scope

This document describes three methods that can be used to determine the hydrophobicity of insulators. Determination of the ability of water to wet the surface of an insulator can be used to evaluate

In the state of the surface of the insulator, or as part of the insulator test in the laboratory.

This document applies to the measurement of the hydrophobicity of the umbrella and umbrella cover materials of composite insulators for overhead lines, substations and electrical equipment.

For the measurement of the hydrophobicity of the porcelain insulator with or without the coating, the measured value represents the hydrophobicity of the test sample at the moment of measurement.

2 Normative references

There are no normative references in this document.

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1

hydrophobicity

It has a low surface tension surface state, so it is repellent to water.

3.2

surface tension

In a layer of a certain thickness (generally less than 0.1μm), the structure and energy change continuously from this phase to another phase.

Note. The pressure (force field) gradient in the interface region is perpendicular to the interface boundary. A net energy is required for the transfer of species from this phase to the interfacial region to form the interface. forming unit

The reversible work required at the interface (surface) is the surface tension, and its thermodynamic definition is as follows.

gamma=

dG

dAT.P.n

where.

gamma --- surface (interfacial) tension or surface energy;

G---total Gibbs free energy of the system;

A---surface (interface) area;

T---temperature;

P---pressure;

N---the number of moles of substance in the system.

Surface tension (gamma) is usually expressed in mN/m, 1mN/m=1dyn/cm.

3.3

static contact angle

When the droplet stays on the solid surface and the surface tension of the solid, liquid and gas phases reaches equilibrium, the boundary between the gas-liquid and the liquid-solid boundary