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

GB/T 31838.6-2021

**Solid insulating materials - Dielectric and resistive properties -
Part 6: Dielectric properties(AC method) - Relative permittivity
and dielectric dissipation factor(frequencies 0.1Hz~10 MHz)**

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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" Drafting.

This document is Part 6 of GB/T 31838 "Dielectric and Resistance Characteristics of Solid Insulating Materials". GB/T 31838 has been released

The following parts.

---Part 1. General Provisions;

---Part 2. Resistance characteristics (DC method) volume resistance and volume resistivity;

---Part 3. Resistance characteristics (DC method) surface resistance and surface resistivity;

---Part 4. Resistance characteristics (DC method) insulation resistance;

---Part 5. Resistance characteristics (DC method) Volume resistance and volume resistivity of dipping and coating materials;

---Part 6. Dielectric characteristics (AC method), relative permittivity and dielectric loss factor (frequency 0.1Hz~10MHz);

---Part 7. Resistance characteristics (DC method) Measuring volume resistance and volume resistivity at high temperatures.

This document uses the translation method to be equivalent to IEC 62631-2-1.2018

“Dielectric and Resistance Characteristics of Solid Insulating Materials Part 2-1.

Relative permittivity and loss factor technical frequency (0.1Hz~10MHz) AC method".

The Chinese documents that have a consistent correspondence with the normative reference documents in this document are as follows.

---GB/T 6672-2001 Plastic film and sheet thickness determination mechanical measurement method (ISO 4593.1993, IDT);

---GB/T 10580-2015 Standard conditions for solid insulating materials before and during the test (IEC 60212.2010,

IDT).

This document has made the following editorial changes.

---In order to be consistent with the existing standard series, the file name is changed to "Solid Insulating Material Dielectric and Resistance Characteristics Part 6.Dielectric Characteristics (AC method) Relative permittivity and dielectric loss factor (frequency 0.1Hz~10MHz)?;

---In order to facilitate the understanding and implementation of the application, the "Null method" in 4.3.2.1 and 4.3.2.2 in IEC 62631-2-1.2018 is revised to "electrical

Bridge Method";

---Due to an editorial error in the original text of IEC 62631-2-1.2018, the ϵ_{nr} in formula (13) is modified to ϵ_0 .

Introduction

Dielectric loss tangent or dielectric loss factor is also called $\tan\delta$, which is a basic parameter to measure the quality of insulating materials. Measuring capacitance

The method of loss angle and loss angle has been used in industry for more than 100 years.

The dielectric loss factor ($\tan\delta$) depends on several parameters, such as electrode design, material properties, environment, humidity, temperature, applied voltage, and mainly

It depends on the test frequency, the accuracy of the test equipment and other parameters applied to the sample.

The frequency range is limited, which depends on the test unit and electrode design, the size of the sample and the connecting wire. Therefore, in this document, all

The frequency parameter is limited to the very low frequency (VLF) range of 0.1Hz~10MHz. However, the measuring instrument can provide a wider frequency

Range, so the available and suitable frequency range is limited by the entire test system.

GB/T 31838 proposes a test method for the dielectric and resistance characteristics of solid insulating materials to test the dielectric properties of solid insulating materials for users.

And resistance characteristics provide a unified sample preparation method and test procedures.

Currently, GB/T 31838 is composed of seven parts.

---Part 1.General Provisions. Put forward the factors that affect the dielectric and resistance characteristics of solid insulating materials, and guide the other parts of the document.

prepared by.

---Part 2.Resistance characteristics (DC method) Volume resistance and volume resistivity. It is proposed to measure solid insulating materials (excluding immersion

Stains and coating materials, casting materials) volume resistance and volume resistivity test methods.

---Part 3.Resistance characteristics (DC method) Surface resistance and surface resistivity. Proposed to measure the surface resistance of solid insulating materials

And the test method of surface resistivity.

---Part 4.Resistance characteristics (DC method) Insulation resistance. A test method for measuring the insulation resistance of solid insulating materials is proposed.

---Part 5.Resistance characteristics (DC method) Volume resistance and volume resistivity of dipping and coating materials. For dipping and coating

For layered insulating materials, test methods for measuring volume resistance and volume resistivity are proposed.

--- Part 6.Dielectric characteristics (AC method) relative permittivity and dielectric loss factor (frequency 0.1Hz ~ 10MHz). mention

A test method for measuring the dielectric properties of solid insulating materials at a frequency of 0.1 Hz to 10 MHz.

---Part 7.Resistance specific (DC method) Measuring volume resistance and volume resistivity at high temperatures. The proposed temperature is not higher than 800 degrees C

The following test methods for determining the volume resistance and volume resistivity of solid insulating materials.

Dielectric and resistance properties of solid insulating materials

Part 6.Dielectric properties (AC method)

Relative permittivity and dielectric loss factor

(Frequency 0.1Hz~10MHz)

1 Scope

This document describes the measurement of the dielectric constant and dielectric loss factor characteristics of solid insulating materials in the frequency range of 0.1 Hz to 100 MHz.

Test method (AC method).

Note. This document mainly considers a measuring device system with a protective electrode.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, dated quotations

Only the version corresponding to that date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to This document.

IEC 60212 Standard conditions for solid insulating materials before and during the test (Standard conditions for use priority

toandduringthetestingofsolidelectricalinsulatingmaterials)

ISO 4593 Plastic Film and Sheeting Mechanical Scanning Determination of Thickness (Plastics-Filmandsheeting-Determinationof

thicknessbymechanicalscanning)

3 Terms and definitions

The following terms and definitions apply to this document.

The terms and definitions used in this document in ISO and IEC can be found on the following website.

3.1

Electrical insulating material

A solid material with negligible low conductivity used to isolate conductor parts with different electric potentials.

Note. The term "electrical insulating material" can also refer to insulating liquids and