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

GB/T 31838.9-2026

**Solid insulating materials - Dielectric and resistive properties - Part 9:
Determination of dielectric properties (AC method) - Relative permittivity and
dielectric dissipation factor - Contact electrode method for insulating films**

固体绝缘材料 介电和电阻特性 第9部分：测定介电特性(AC方法) 相对介电常数和
介质损耗因数 绝缘薄膜的接触电极法

(English Translation)

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Foreword

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

Drafting.

The following section.

---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 resistivity and volume resistivity

of impregnated and coated materials;

---Part 6: Dielectric Properties (AC Method) Relative Permittivity and Dielectric Loss Factor (Frequency 0.1Hz~10MHz);

---Part 7: Resistance Characteristics (DC Method) Measurement of Volume Resistivity and Volume Resistance at High Temperatures;

---Part 8: Determination of Dielectric Properties (AC Method) Relative Permittivity and Dielectric Loss Factor (Frequency 1MHz~300MHz);

---Part 9: Determination of Dielectric Properties (AC Method) Relative Permittivity and Dielectric Loss Factor Contact Electricity of Insulating Films Extreme method.

This document is equivalent to IEC 62631-2-3:2024 "Dielectric and resistive properties of solid insulating materials - Part 2-3.Relative permittivity".

Contact electrode method (AC method) for insulating thin films with dielectric loss factor and dielectric loss factor.

The following minimal editorial changes have been made to this document.

a) To align with existing standards, the standard title has been changed to "Dielectric and resistive properties of solid insulating materials - Part 9: Measurement".

"Contact Electrode Method for Insulating Thin Films with Constant Dielectric Properties (AC Method) - Relative Permittivity and Dielectric Loss Factor";

b) Incorporating the content of IEC 62631-2-3:2024/COR1.2025, the flatness in Figure 1 is corrected from 0.001 to 0.0005.

In Figure A.4a), the value of α is corrected from 0.9 to 0.09;

c) Adjust ISO 21920-2, which is only cited in the notes and informative appendices, from Chapter 2 to the references.

This document was proposed by the China Electrical Equipment Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Electrical Insulation Materials and Insulation Systems (SAC/TC301).

Introduction

For insulation applications, the relative permittivity of polymer insulating films with a thickness of approximately 10 μm to 100 μm and without any additional layers is measured.

The relative permittivity and dielectric loss factor ($\tan\delta$) are very important. Currently, the relative permittivity and dielectric loss of very thin monolayer polymer films are measured.

Due to a lack of suitable technology and standards, polymer insulating films can be obtained by using multilayer polymer film stacks of 20 to 50 layers.

The average relative permittivity and dielectric loss factor are obtained, but the influence of air gaps between multilayer materials cannot be ignored. Utilizing polymers...

Metallized electrodes on the thin film surface were used in laboratory studies to obtain the relative permittivity and dielectric loss factor of the polymer insulating film.

Acceptance of results. This document provides the measurement of the relative permittivity of thin polymer insulating films without any additional layers or metallization at the technical frequency.

GB/T 31838 "Dielectric and resistive properties of solid insulating materials" is proposed to consist of the following ten parts.

---Part 1: General Principles. The purpose is to establish the general principles for testing the dielectric and resistive properties of solid insulating materials.

---Part 2: Resistance Characteristics (DC Method) Volume resistivity and volume resistivity. The purpose is to describe the determination of resistance in solid insulating materials.

Test methods for volume resistivity and volume resistivity (excluding impregnation and coating materials and casting materials).

---Part 3: Resistance Characteristics (DC Method) Surface resistance and surface resistivity. The purpose is to describe the determination of resistance in solid insulating materials.

Test methods for surface resistance and surface resistivity.

---Part 4: Resistance Characteristics (DC Method) Insulation Resistance. The purpose is to describe the test method for determining the insulation resistance of solid insulating materials.

Verification method.

---Part 5: Resistance Characteristics (DC Method) Volume resistivity and volume resistivity of impregnated and coated materials. The purpose is to describe...

Test methods for determining the volume resistivity and volume resistivity of impregnated and coated insulating materials.

---Part 6: Dielectric Properties (AC Method) Relative permittivity and dielectric loss factor (frequency 0.1Hz~10MHz).

The purpose is to describe a test method for determining the dielectric properties of solid insulating materials at frequencies from 0.1 Hz to 10 MHz.

---Part 7: Resistance Specificity (DC Method) Measurement of volume resistivity and

volume resistivity at high temperatures. The aim is to describe the measurement temperature...

Test methods for volume resistivity and volume resistivity of solid insulating materials at temperatures not exceeding 800°C.

---Part 8: Determination of dielectric properties (AC method) Relative permittivity and dielectric loss factor (frequency 1MHz~300MHz).

The purpose is to describe a test method for determining the dielectric properties of solid insulating materials at frequencies from 1 MHz to 300 MHz.

---Part 9: Determination of Dielectric Properties (AC Method) Relative Permittivity and Dielectric Loss Factor Contact Electrodes of Insulating Thin Films the purpose is to describe the method for measuring single-layer metallized samples with a thickness of 10 µm to 100 µm without any additional metallization on the sample surface.

Measurement techniques and testing methods for the relative permittivity and dielectric loss factor of polymer insulating films.

Test methods for volume resistivity and volume resistivity of cast resin insulating materials.

Dielectric and resistive properties of solid insulating materials Part 9: Determination of Dielectric Properties (AC Method) Relative permittivity and dielectric loss factor Contact electrode method for insulating thin film

1 Scope

This document describes the measurement of monolayer polymers with thicknesses ranging from 10 µm to 100 µm without any additional metallization on the sample surface.

Measurement techniques and testing methods for the relative permittivity and dielectric loss factor of insulating films.

This document applies to measurements at 50Hz or 60Hz power frequency and 1Hz~1MHz frequency.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

ISO 4593 Method for mechanical scanning of thickness measurement of plastic films and