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

GB 11142-1989

Replacing GB/T 11142-1989

**Determination for gassing properties of insulating oil under
electrical stress and ionization
(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.

This document supersedes GB/T 11142-1989 "Determination of Gas Emission Properties of Insulating Oil under Electric Field and Ionization", and is consistent with GB/T 11142-Compared to 1989, aside from structural adjustments and editorial changes, the main technical changes are as follows.

- The scope has been changed (see Chapter 1, Chapter 1 of the 1989 edition);
- The specifications for the gas measuring tube have been changed (see 4.1.4, 4.1.1.3 of the 1989 edition);
- Increased the temperature control accuracy requirements for heating devices (see 4.2, 4.1.2 of the 1989 edition);
- The specifications for syringes have been changed (see 4.6, 4.1.6 of the 1989 edition);

---The cleaning solvent has been changed (see 5, 6.1, 6.2; Chapter 5, 6.1, 6.2 of the 1989 edition);

---Sampling requirements have been added (see 7);

---The hydrogen flow rate has been changed (see 8.4, 7.4 in the 1989 edition);

---The parallelism test and calculation method for gas evolution properties have been revised (see 8.10, Chapter 9, Chapter 8 of the 1989 edition);

---The precision requirements for gas evolution have been changed, and statistical analysis of test results has been added (see Chapter 11, Chapter 9 of the 1989 edition).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed and is under the jurisdiction of the National Technical Committee on Standardization of Petroleum Products and Lubricants (SAC/TC280).

Introduction

This document is used to determine the ability of insulating oil to absorb or release gases under the influence of an electric field (or ionization). The specifications in this document...

In this method, after saturating the insulating oil with high-purity hydrogen, the oil and the hydrogen layer on the oil surface are subjected to a voltage of 10kV, a frequency of 50Hz, and an oil temperature of [missing information].

Under conditions of 80°C, an electrode gap of 3mm, and continuous ionization for 60min, the oil-hydrogen interface discharges due to the radial electric field.

The reaction causes the oil itself to absorb or release gas, and its gas evolution property is expressed as the volume of gas absorbed or released by the sample per unit time.

This document specifies the method for determining the gas evolution property of insulating oil under electric field and ionization effects. This method is based on years of technological development and practical experience.

Based on past experience, this document has been revised and updated as necessary as the 1989 version.

This document emphasizes the importance of safe operation. Users must have relevant laboratory work experience and follow relevant guidelines.

Safety regulations are in place to ensure the safety and effectiveness of the experimental process.

The purpose of this document is to provide a scientific and standardized method for selecting insulating oils for electrical equipment, so as to ensure the safety and stability of

electrical equipment.

run.

Determination of Gas Evolution Properties of Insulating Oil under Electric Field and Ionization Warning---Personnel using this document should have practical experience in formal laboratory work. The use of this document may involve certain hazardous activities.

This document does not address all potential safety issues related to the materials, equipment, and operations used. Users are responsible for taking appropriate safety and health precautions.

Implement the measures and ensure they comply with the conditions stipulated by relevant national laws and regulations.

1 Scope

This document describes the determination of the electric field strength sufficient to induce discharge at the oil-gas interface when insulating oil is subjected to a gas evolution cell of a specific geometry.

A method of releasing or absorbing gas under (or ionization) action.

This document applies to the testing of gas evolution properties of mineral insulating oils, natural ester insulating oils, synthetic ester insulating oils, and silicone-based insulating oils.

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.

GB/T 1220-2007 Stainless Steel Bars GB/T 7597 Sampling Method for Oils Used in Power Generation (Transformer Oil, Turbine Oil)

3 Terms and Definitions

The following terms and definitions apply to this document.

Gas evolution properties when insulating oil is subjected to an electric field or ionization strong enough to cause a discharge at the oil-gas interface, the oil itself exhibits the behavior of absorbing or releasing gas.

The body's capabilities.

4.1 Gas Analyzer

4.1.1

The gas analyzer consists of a gas analysis cell, a gas measuring tube, a hollow high-voltage electrode, etc., and its structure is shown in Figure 1.

4.1.2

The gas evolution cell is made of hard borosilicate glass. The part of the gas evolution cell subjected to the electric field consists of an inner diameter of $16\text{mm} \pm 0.2\text{mm}$ and an outer diameter of...

It is made of a thin-walled glass tube with a diameter of $18\text{mm} \pm 0.2\text{mm}$ (dimensions shown in Figure 2). The exterior of the gas evolution cell is coated with solvent-resistant silver paint as the external electrode (connected to...).

The external electrode should have a grounding copper wire. A vertical slit should be made on the external electrode to observe the reaction of the oil surface.

4.1.3

The hollow high-voltage electrode is made of stainless steel bar with steel grade 06Cr19Ni10 conforming to GB/T 1220-2007, and the surface is polished.

The hollow high-voltage electrode has an outer diameter of $10\text{mm} \pm 0.1\text{mm}$ (see Figure 2 for dimensions), and a stainless steel electrode with an outer diameter of 2mm and an inner diameter of 1mm is inserted inside.

A steel capillary tube serves as the hydrogen channel. The electrode is supported by a precision-machined 24/29 tapered PTFE plug with a centrally drilled hole, ensuring alignment.

The sealing of the conical PTFE plug in the center of the gas evolution cell should be checked after multiple uses. The hydrogen inlet pipe is located at the top of the hollow high-voltage electrode.

A metal three-way stopcock is installed on the opening.

4.1.4

The gas measuring tube is a borosilicate glass U-shaped tube with an outer diameter of 7 mm and graduations (in mm), with a 14/25 tapered glass ground joint.