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

**GB/T 21222-2007**

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**Methods for the determination of the lightning impulse  
breakdown voltage of insulating liquids**

绝缘液体 雷电冲击击穿电压测定方法

**(English Translation)**

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### Foreword

This standard is identical with IEC 60897. 1987 "lightning impulse breakdown voltage of insulating liquid measuring method" (in English).

For ease of use, this standard made the following editorial changes.

- a) Delete the international standard "foreword";
- b) use the decimal symbol '. 'Decimal symbol instead of' ';
- c) with a number of Arab '2' instead of the Roman number 'I, II'.

The Standard Appendix A, Appendix B is an informative annex.

The standard proposed by China Electrical Equipment Industrial Association.

This standard by the National Standardization Technical Committee of the insulating material (SAC/TC51) centralized.

This standard was drafted. Guilin Electrical Apparatus Research Institute, Xi'an Jiaotong University.

### 1 Scope

#### 1.1

standard specifies two test methods A and B, is used to assess the insulating liquid is subjected to standard lightning pulse at divergent field power Gas intensity.

A test method is based on a step by step procedure for assessment under specified conditions of impulse breakdown voltage.

Method B is a statistical test used to test the insulating liquid at a given voltage pulse breakdown probability assumptions.

## 1.2

Both methods are applicable to unused or used insulating liquids, the viscosity of the liquid should be at 40 °C lower than 700mm<sup>2</sup>/s.

Both methods can use positive and negative pulses. For the preparation of liquid samples, as long as it meets the requirements for industrial use, and no special Provisions. However, before and after the test by sample handling and processing can indicate how effective treatment.

## 1.3

two methods used to establish standard procedures for assessing the insulating liquid pulsed electric strength. These programs are used to distinguish between different electricity Liquid medium, it can also be used to detect the characteristic changes when a chemical manufacturing process or material changes in the composition of the liquid changes in turn caused.

# 2 Overview

## 2.1

insulating liquid for use in electrical equipment may be subjected to lightning or switching frequency sinusoidal instantaneous voltage and the operating voltage superimposed effect.

Whether this is a one-way or over-voltage oscillation, the result will be positive or negative polarity of the transient effect, which requires knowledge of Insulating liquid properties under these conditions.

However, in order to make the use of needles - pulse test vessel ball shape of the electrodes obtained with the actual breakdown voltage insulation system liquid Consistent performance, but also we need more practical experience.

## 2.2

in the insulating liquid, pulse breakdown is a complex phenomenon still unclear. It needs to start a pre-breakdown damage (streamer) of and the spread of the process.

Breakdown voltage and the following factors. the voltage waveform, the duration of the applied voltage and the electric field distribution.

In order to obtain comparable results, all of these factors should be clearly defined and strictly controlled. Nevertheless, the findings are often Results Compared dispersion, this dispersion is always connected and pre-breakdown mechanism related to randomness.

## 2.3

Although the uniform electric field, the polarity of the voltage breakdown characteristics are not applied, but in a divergent field, the polarity of a significant breakdown characteristics

Prominent role, especially for needle - ball-shaped electrode is greater impact. Practice has proved that the electric field distribution, the chemical composition of the liquid Negative pulse breakdown characteristics play a major role. Therefore, in order to identify the chemical composition of the insulating liquid, must be above the two Methods used in the high finish electrode system shape.

#### **2.4**

impulse breakdown voltage with the forefront of the delay wave, and therefore the two methods defined in the standard use only full-wave pulses (1.2/50 $\mu$ s).

#### **2.5**

with frequency breakdown voltage (IEC 60156) different pin - ball impulse breakdown substantially independent of moisture, particles and other impurities. Thus, as long as Impurity concentration does not exceed the limit use liquid, do not take any preventive measures to control these impurities.

### **3 Normative References**

The following documents contain provisions which, through reference in this standard and become the standard terms. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard, however, encourage the parties to the agreement are based on research Whether the latest versions of these documents. For undated reference documents, the latest versions apply to this standard.

GB/T 311.6-2005 high voltage test techniques Part 5. Measuring ball gap (IEC 60052:2002, IDT) GB/T 16927.1-1997 high voltage test techniques - Part 1. General Test Technology (eqv IEC 60060-1. 1989) GB/T 16927.2-1997 high voltage test techniques - Part 2. Measuring systems (eqv IEC 60060-2:1994) IEC 60060-3 High voltage test techniques - Part 3. Measuring device GB/T 21222-2007/IEC 60897. 1987