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

GB/T 29306.2-2012

**Recommended methods for the determination of the dielectric
properties of insulating materials at frequencies above 300 MHz
-- Part 2: Resonance methods**

绝缘材料在300 MHz以上频率下介电性能测定方法 第2部分：谐振法

(English Translation)

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Foreword

GB/T 29306 "insulating material frequency dielectric properties determination in the 300MHz or more" is divided into the following sections.

--- Part 1. General;

--- Part 2. Resonance.

This section GB/T Part of 229,306.

This section drafted in accordance with GB/T 1.1-2009 given rules.

The partial modification using IEC 60377-2. "PART 21977 insulating materials at frequencies above 300MHz dielectric properties measurement method Score. Resonance. " this part of IEC 60377-2. compared to 1977, mainly technical changes are as follows.

--- Increased in Chapter 2 of normative references, reg numbers have been adjusted accordingly;

--- Remove the IEC 60377-2. 1977 Annex IEC 60377-3 (IEC no description) A involved.

This part is proposed by the China Electrical Equipment Industrial Association.

This part of the National Electrical insulation materials and insulation systems assessment Standardization Technical Committee (SAC/TC301) centralized.

This section is drafted. Guilin Electrical Apparatus Research Institute, Xi'an Jiaotong University, Beijing Electrical Machinery Industry Technical and Economic Research Institute.

Introduction

Measurement methods described in this section includes a resonator use. Described resonator consists of a given cross-section of the transmission line Segments, the ends of the transmission line is short-circuited at a pitch of half the operating wavelength of any integer multiple. When the sample is inserted resonators, the operating wavelength Changed. To rebuild the resonance frequency needs to be changed accordingly or variation of the length of the resonator, the Q value of the corresponding changes of measurable sample Dielectric properties.

Resonance compared with other test methods, its significant advantage is that it has a high unloaded Q-value, the use of appropriate and good waveform this design can be obtained Q value; this technique can measure very low loss factor of the sample. So take advantage of this method is usually preferred Points to address particular measurement problems (frequency, specimen geometry and dielectric properties) with a resonator. In order to avoid the test results are not clear, it is necessary to Aberdeen Check finely field configuration. Therefore, the resonator is necessarily a narrow band device, the test frequency is determined by the number of samples within the resonator, the shape of the dielectric Performance and position of the decision.

Common resonators are the following.

Cavity frequency range of sample types shape Memo Number Concave cavity Coaxial resonator Cavity (closed) "Speak up" an optical resonator 100MHz ~ 1GHz 1GHz ~ 3GHz 1GHz ~ 30GHz > 3GHz > 30GHz Circular plate shape Tubular Circular plate shape, a rod Circular plate shape Plate, sheet $\epsilon_r \leq 10$ $\epsilon_r > 5$ A.1 A.2 A.3 A.4 A.5 Note. The limit frequency and the permittivity is only approximate, if the rate of loss factor or capacitance measurement sensitivity allows to reduce it, you can exceed the limit (see Chapter GB)/T 29306.1-2012 4th.

Various resonator and its corresponding test method and calculation discussed in more detail in Appendix A were made.

Insulating materials at frequencies above 300MHz Determination of dielectric properties Part 2. Resonance method

1 Scope

This section GB/T 29306 specifies the test method for determination of resonant dielectric properties of insulating materials.

This section applies to the determination of the resonant microwave frequency range (from about 300MHz up to optical frequencies) in solid, liquid or molten medium Relative permittivity, dielectric loss factor and the amount of material related to this, such as loss exponent.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document.

GB/T 1409-2006 Measurement of electrical insulating materials at power, audio, high-frequency (including meter wavelengths included) of the permittivity and dielectric loss Consumption factor recommended method (IEC 60250. 1969, MOD) GB/T 29306.1-2012 insulating materials at frequencies above 300MHz dielectric properties measurement method - Part 1. General (IEC 60377-1. 1973, MOD)

3 Test device

Main circuit diagram of a resonant test apparatus is shown in Figure 1, the test device is composed as follows.

3.1

A sufficient power to provide the desired frequency generator. In the full frequency range of the desired frequency can be manually adjusted, it can also be automatically adjusted (a sweep source).

Note 1: The sweep generator and a display device (see 3.2.2) used in combination, for quick test. The operation should be noted that the shape of the resonance curve of the display is not received High scan speed influence.

Adjustable output power and require automatic control (ALC).

Note 2: For fixed-frequency testing artificial FM generator with sufficient degree of job stability, typically less than or equal to 1ppm frequency stability on enough.

Note 3: In order to avoid frequency pulling is recommended between the frequency generator and insert a loop isolator or attenuator.

In order to avoid false resonant, harmonic content should be less than 1%.

3.2

a sufficient sensitivity detector under test frequency, various forms of such detectors may be used with a manual or automatic adjustment FM Frequency generator together.

3.2.1

Since the fixed frequency detector test will have sufficient job stability, whether or not there is an enlarged diode volt Meter, or with or without automatic frequency automatic frequency (AFC) is transferred to the receiving device can output microwave generator frequency or low frequency, are it can be used as a detector.

Note 1: Generally, the broadband detector more convenient to use, because without such a detector tuned generator frequency, and resonance apparatus can adequately distinguish Do the outside of microwave interference. However, it should pay attention to the detector input level is low, and the shield at microwave frequencies are effective, but at low frequencies Next is not necessarily effective; therefore, a region affected by environmental interference must have a receiver has been tuned. In any case, it should pay attention to avoid Free power line may be provided by electronic devices and shielded interconnecting waveguide formed by ground loops.