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

GB/T 1695-2005

**Rubber, vulcanized - Determination of electrical breakdown
strength and voltage resistant at commercial power frequency
(English Translation)**

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Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	5
4 Test device...	6
5 Specimen...	8
6 Time interval between vulcanization and test...	9
7 Test medium...	9
8 Test steps...	9
9 Test results...	10
10 Test report...	10

Foreword

This standard corresponds to the American Military Materials and Testing Association standard ASTM D149-97a "Standard test method for dielectric breakdown voltage and dielectric strength of solid electrical insulating materials at commercial power frequencies". The degree of consistency with ASTM D149-97a is non-equivalent.

This standard replaces GB/T 1695-1981 (1989) "Vulcanized rubber - Test method for industrial frequency puncture voltage and dielectric strength".

This standard revises GB/T 1695-1981(1989) according to ASTM D149-97a. The main technical differences between this standard and ASTM D149-97a are as follows.

- ASTM D149-97a has a wide range of applications. It is aimed at the determination of power frequency breakdown voltage and dielectric strength of solid insulating materials. This standard is basically consistent with ASTM D149-97a in terms of technical contents such as electrode materials, electrode dimensions, test device.
- Based on the verification test, the provisions of taking the median in GB/T 1695-1981(1989) are retained, which is different from the provisions of taking the mean in ASTM D149-97a.

- This standard is only for rubber materials; it only specifies two types of electrodes and two boosting methods.

Compared with GB/T 1695-1981 (1989), the main changes in this standard are as follows.

- ADD a reference to this standard;
- ADD a warning to this standard;
- ADD Chapter 2 Normative references to this standard;
- ADD Chapter 3 Terms and definitions to this standard;
- ADD a plate electrode in 4.5.2 to this standard;
- ADD the requirements for specimen thickness measurement devices in 4.6 of this standard.

This standard was proposed by the China Petroleum and Chemical Industry Association.

This standard shall be under the jurisdiction of the Rubber Physical and Chemical Test Methods Technical Committee of the National Rubber Standardization Committee (SAC/TC 35/SC 2).

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Warning - Personnel using this standard shall have practical experience in formal laboratory work. This standard does not point out all possible safety issues. Users are responsible for taking appropriate safety and health measures and ensuring compliance with the conditions stipulated in relevant national laws and regulations.

1 Scope

This standard applies to the application of AC voltage to the specimen by continuous uniform or step-by-step voltage increase until breakdown, measuring the breakdown voltage value, calculating the breakdown strength of the specimen; using the method of rapid voltage increase, the voltage is increased to a specified value; the specimen is kept for a certain period of time without breakdown; this specified value is determined as

the withstand voltage value of the specimen.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 2941 Rubber-Standard temperatures, humidities and times for the conditioning environmental and testing of test pieces (GB/T 2941-1991, eqv ISO 471.1983)

GB/T 5723 Rubber, vulcanized or thermoplastic - Determination of dimensions of test pieces and products for test purposes (GB/T 5723-1993, eqv ISO 4648.1991)

GB/T 9865.1 Rubber, vulcanized or thermoplastic - Preparation of samples and test pieces - Part 1.Physical tests (GB/T 9865.1-1996, idt ISO 4661-1.1993)

3 Terms and definitions

The following terms and definitions apply to this standard.

4.2.1 The capacity of the high voltage transformer shall ensure that the secondary rated

current is not less than 0.1 A and the equipment is not burned at the moment of breakdown.

4.2.2 In order to ensure that the voltage can rise evenly and control the voltage increase

speed, an automatic voltage increase device shall be used.

4.3 Voltage regulating transformer

The voltage regulator shall be able to adjust the voltage evenly; its capacity shall be the same as that of the test transformer. The voltage can be measured on the high voltage

side, using a high voltage electrostatic voltmeter of not more than 2.5 level, a ball gap or through a voltage transformer, or on the low voltage side using a voltmeter of not more than 1.5 level, with a measurement error of $\pm 4\%$.

4.4 Overcurrent relay

The operating current of the overcurrent relay shall make the secondary current of the high voltage test transformer less than its rated value.

4.5.1 Electrode material

The electrode material of the plate specimen is brass; the inner electrode material of the tubular specimen electrode is aluminum foil, copper rod, conductive powder, etc.; the outer electrode material is aluminum foil and copper foil.

4.5.2 Electrode size

The upper and lower electrode sizes of the plate specimen are shown in Figure 2; the electrode sizes of the tubular specimen are shown in Figure 3; the electrode sizes are shown in Table 1.

8.2 Withstand voltage test

Raise the voltage quickly to the voltage value specified by the product standard and stay for 1 min, to observe whether the specimen breaks down. If not, this voltage is determined as the withstand voltage value.

9 Test results

The breakdown voltage intensity E (kV/mm) is calculated according to the following formula.

Where.

U - Breakdown voltage, in kilovolt (kV);

d - Specimen thickness, in millimeter (mm).

Take the median of the 3 specimens as the test result; keep one decimal place.