

ICS 29.035.99

CCS K 15



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

GB/T 1408.1-2016

**Insulating materials -- Test methods for electric strength -- Part
1: Test at power frequencies
(English Translation)**

Issued on: December 13, 2016

Implemented on: July 1, 2017

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine**

Table of Contents

Foreword...	3
1 Scope...	5
2 Normative References...	5
3 Terms and Definitions...	6
4 Significance of the Test...	7
5 Electrodes and Specimens...	8
6 Conditioning before Tests...	14
7 Surrounding Medium...	14
8 Electrical Apparatus...	16
9 Procedure...	17
10 Mode of Increase of Voltage...	18
11 Criterion of Breakdown...	20
12 Number of Tests...	21
13 Report...	21
Annex A (Informative) Treatment of experimental data...	29
Bibliography...	30

Foreword

GB/T 1408 Insulating Materials - Test Methods for Electric Strength can be divided into the following 3 parts.

- Part 1. Test at Power Frequencies;
- Part 2. Additional Requirements for Tests Using Direct Voltage;
- Part 3. Additional Requirements for 1.2/50µs Impulse Tests.

This Part belongs to Part 1 of GB/T 1408.

This Part replaced GB/T 1408.1-2006 Electrical Strength of Insulating Materials - Test Methods - Part 1. Tests at Power Frequencies. Compared with GB/T 1408.1-2006, this Part has the major technical changes as follows.

- Modify "Normative References" (see Clause 2 of this Edition; Clause 2 of 2006 Edition);

- Add the test requirements for "sphere-plate electrode" (see 5.2.1.3 of this Edition);
- Add the test requirements for "elastomer" (see 5.2.6.2.4 of this Edition);
- Add "test in solid materials" (see 7.4 of this Edition);
- Add schematic diagram of "sphere-plate electrode" [see Figure 1c) of this Edition];
- Delete Annex B (see Annex B of 2006 Edition).

This Part uses translation method to equivalently adopt IEC 60243-1.2013 Electric Strength of Insulating Materials - Test Methods - Part 1.Tests at Power Frequencies (3rd Edition).

The Chinese documents that have a consistency relationship with the international documents quoted in the Normative References of this Part are as follows.

- GB/T 1981.2-2009 Varnishes Used for Electrical Insulation - Part 2.Methods of Test (IEC 60464-2.2001, MOD)
- GB 2536-2011 Fluids for Electrotechnical Applications - Unused Mineral Insulating Oils for Transformers and Switchgear (IEC 60296.2003, MOD)
- GB/T 5471-2008 Plastics - Compression Molding of Test Specimens of Thermosetting Materials (ISO 295.2004, IDT)
- GB/T 7113.2-2014 Flexible Insulating Sleeving - Part 2.Methods of Test (IEC 60684-2.2003, MOD)
- GB/T 9352-2008 Plastic - Compression Moulding of Test Specimens of Thermoplastic Materials (ISO 293.2004, IDT)
- GB/T 10580-2015 Standard Conditions for Use Prior to and During the Testing of Solid Electrical Insulating Materials (IEC 60212.2010, IDT)
- GB/T 15022.2-2007 Resin Based Reactive Compounds Used for Electrical Insulation - Part 2.Methods of Test (IEC 60455-2.1998, MOD)
- GB/T 17037.3-2003 Plastics - Injection Moulding of Test Specimens of Thermoplastic Materials - Part 3.Small Plates (ISO 294-3.2002, IDT)
- GB/T 21218-2007 Specifications for Unused Silicone Insulating Liquids for Electrotechnical Purposes (IEC 60836.2005, IDT)

This Part was proposed by China Electrical Equipment Industrial Association.

This Part shall be under the jurisdiction of National Technical Committee for the Standardization of Electrical Insulation Materials and Insulation System Evaluation (SAC/TC 301)

Drafting organizations of this Part. Suzhou Taihu Electric Advanced Material Co., Ltd.; Yantai Metastar Special Paper Co., Ltd.; Machinery Industry Beijing Electrotechnical Institute of Economic Research; Shanghai Electric Cable Research Institute; Zhuzhou Times Electric Insulation Co., Ltd.; and Guilin Electrical Equipment Scientific Research Institute Co., Ltd.

Chief drafting staffs of this Part. Wu Hao, Zhang Chunqi, Guo Zhenyan, Wang Dianxin, Xu Xiaofeng, Xia Junfeng, Liu Yali, Zeng Zhi, Zhang Junha, Wang Yiliang, Wu Bin, and Wang Xianfeng.

The historical editions replaced by this Standard are as follows.

--- GB/T 1408-1978, GB/T 1408-1989, GB/T 1408.1-1999, GB/T 1408.1-2006.

Insulating Materials - Test Methods for Electric
Strength - Part 1. Test at Power Frequencies

1 Scope

This Part of GB/T 1408 provides test methods for the determination of short-time electric strength of solid insulating materials at power frequencies between 48 Hz and

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

ISO 293 Plastics - Compression Moulding of Test Specimens of Thermoplastic Materials

ISO 294-1 Plastics - Injection Moulding of Test Specimens of Thermoplastic Materials - Part 1. General Principles, and Moulding of Multipurpose and Bart Test

Specimens

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

Loss of the insulating properties of the gas or liquid medium surrounding a test specimen and electrodes while exposed to electric stress, which causes the current in the test circuit to operate an appropriate circuit-breaker.

Quotient of the breakdown voltage and the distance between the electrodes between which the voltage is applied under the prescribed test conditions.

4 Significance of the Test

Electric strength test results obtained in accordance with this standard are useful for detecting changes or deviations from normal characteristics resulting from processing variables, ageing conditions or other manufacturing or environmental situations.

Materials with high electric strength will not necessarily resist long-term degradation processes such as heat, erosion or chemical deterioration by partial discharges, or electrochemical deterioration in the presence of moisture, all of which may cause failure in service at much lower stress.

5 Electrodes and Specimens

If a fixture is employed, which accurately aligns upper and lower electrodes within 1.0 mm, the diameter of the lower electrode may be reduced to (25.0 ± 1.0) mm, the diameters of the two electrodes differing by no more than 0.2 mm, as shown in Figure 1b).

The outer electrode shall be a band of metal foil (75.0 ± 1.0) mm wide and the inner electrode, a disk of metal foil (25.0 ± 1.0) mm in diameter, flexible enough to conform with the curvature of the cylinder. The arrangement is shown in Figure 3.

Two parallel holes are drilled perpendicularly to the surface, with centers (25 ± 1) mm apart and of such a diameter that, after reaming with a reamer having a taper of approximately 2 %, the diameter of each hole at the larger end is not less than 4.5 mm