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CCS K15

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 29310-2012

Guide for the statistical analysis of electrical insulation breakdown data

电气绝缘击穿数据统计分析导则

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Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules. This standard uses the translation method identical with IEC 62539.2007 "Electrical insulation breakdown statistical analysis guidelines." Consistency correspondence with this standard Normative documents of the following documents.

--- GB/T 1408.1-2006 electrical insulating materials strength test methods - Part 1. Tests at power frequencies (IEC 60243-1. 1998, IDT)

--- GB/T 1408.2-2006 electrical insulating materials strength test methods - Part 2. Additional tests using direct voltage Requirements (IEC 60243-2.2001, IDT)

--- GB/T 1408.3-2007 electrical insulating materials strength test methods - Part 3. 1.2/50μs impulse tests Additional requirements (IEC 60243-3.2001, IDT) The standard proposed by China Electrical Equipment Industrial Association. This standard by the National Electrical insulation materials and insulation systems assessment Standardization Technical Committee (SAC/TC301) centralized. This standard was drafted. Harbin Polytechnic University, Shandong Qilu Motor Manufacturing Co., Ltd., Shunde quality and technical supervision standards And coding, Shanghai Electrical Apparatus Research Institute (Group) Co., Ltd., Beijing Electrical Machinery Industry Technology Research Institute of Economy, Cooper Power System National R & D center. The main drafters of this standard. Liu column, Weng Ling, Zhao Chao, Liu Yali, Ouyang Dan SCENCE Zhang Shengde, Rui, Wei Jingsheng, Shi Hui, Yang, Wang Kun.

This standard is described with examples statistical method used to analyze the breakdown of time to get from the electrical testing of solid insulating material and The breakdown voltage of the data, the purpose of characterizing the system compared with other insulation system of relations, and the forecast is for a given time or voltage breakdown The probability. Electrical insulation breakdown statistical analysis Guide

1 Scope

GB/T 29310-2012 is about what to do with breakdown data once it has been collected. Insulation does not fail at a single, repeatable value: test a set of nominally identical specimens and each one breaks down at a different time or a different voltage, because breakdown is governed by the weakest point in the material and the weakest point varies. The scatter is not experimental error, it is the property being measured, and reading it correctly is the difference between a meaningful design margin and a number that happens to fit the samples that were tested. This guide sets out the statistical methods for analysing data from the two standard test regimes - constant stress tests, which yield times to

breakdown, and step stress tests, which yield breakdown voltages - covering the choice of distribution, the estimation of its parameters, confidence intervals, and the comparison of data sets, worked through with examples. It is filed under ICS 29.035.01 and CCS K15 and is intended for the insulation laboratories, cable and material manufacturers, and equipment designers who have to turn a set of scattered breakdown results into a defensible statement about a material's endurance.

Electrical insulation systems and materials may be constant stress and step stress test test. In constant stress test, the test data for the promise Multi-sample breakdown time; in step stress test, the test data for the breakdown voltage of the sample. In both cases, for each test Samples will differ from experimental data obtained, but under the given experimental conditions, the experimental data obtained show a certain statistical distribution. this Criteria to analyze these data by statistical analysis method instance. The purpose of this standard is to define the statistical methods used to analyze the breakdown of time to get from the electrical testing of solid insulating material and strike Breakdown voltage, to characterize the system compared with other insulation system of relations, and predicted probability at a given time and voltage breakdown. The method used to analyze the complete data and censored data, censored data, not all samples are breakdown. This standard includes the following Methods, and there are examples of. determining whether the data is suitable for fitting distribution; optimal distribution parameter estimation method based on graphics and computer; computer-based Estimating the statistical confidence interval; and a method of comparative databases and case studies. These can be presented as fully Weibul distribution methods but also show some other analysis methods such as Gumbel distribution and normal distribution. This standard does not involve determining short-withstand voltage or insulation system working voltage. Mathematical methods in this standard can not be directly used Assess the life of the device.

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. Dielectric ASTMD149-97a (2004) in the case of using the frequency of solid electrical insulating materials and dielectric breakdown voltage strength standard Standard Test Method (Standardtestmethodfordielectricbreakdownvoltageanddielectricstrengthofsolid electricalinsulatingmaterialsatcommercialpowerfrequencies) Test methods BS2918-2 electric strength of solid insulating materials (Methodsoftestforelectricstrengthofsolid insulatingmaterials)

IEC 60243 (all parts), electrical insulating materials strength testing method (Electricalstrengthofinsulatingmaterials- Testmethods) Data analysis step

3.1 Data Collection

3.1.1 Common testing techniques There are two common electrical insulation breakdown test. constant stress and step stress test test. In both tests, a plurality of identical test Subjected to the same kind of electrical breakdown test. In constant stress test, the breakdown voltage is applied to the same time in each sample was measured. breakdown Time distribution range is very wide, the longest breakdown time may be twice the shortest time. In step stress test, gradually increasing the voltage applied To each sample, typically measured breakdown voltage. Voltage may continually increase or a slight increase over time. In accordance with other standards, e.g. Impact test may also be used. Breakdown voltage distribution is small, sometimes only the highest voltage of 2% larger than the minimum voltage. Different standards [such as BS2918-2 and

IEC 60243 (all parts)] lists the constant stress and step stress test test program. This standard is intended to provide a more rigorous way to deal with the breakdown of data methods.