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GB/T 26168.2-2018

Electrical insulating materials -- Determination of the effects of ionizing radiation -- Part 2: Procedures for irradiation and test

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Foreword

GB/T 26168 "Electrical insulation materials to determine the impact of ionizing radiation" is divided into the following parts.

--- Part 1. Radiation interactions and dosimetry;

--- Part 2. Irradiation and test procedures;

--- Part 3. Application grading system in a radiation environment;

--- Part 4. Assessment procedures for aging during operation.

This part is the second part of GB/T 26168.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GB/T 26168.2-2010 "Electrical insulating materials to determine the effects of ionizing radiation - Part 2. Irradiation and testing

Procedures, the main technical content changes compared with GB/T 26168.2-2010 are as follows.

--- Revised the normative reference document (see Chapter 2, Chapter 2 of the.2010 edition);

This section uses the translation method equivalent to the use of IEC 60544-2.2012 "Electrical insulation materials to determine the effects of ionizing radiation Part 2.

Irradiation and test procedures.

The documents of our country that have a consistent correspondence with the international documents referenced in this part are as follows.

---GB/T 528-2009 Determination of tensile stress-strain properties of vulcanized rubber or thermoplastic rubber (ISO 37.2005, IDT);

---GB/T 1040 (all parts) Determination of tensile properties of plastics [ISO 527 (all parts), IDT];

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GB/T 1408.1-2016 Test methods for electrical strength of insulating materials - Part 1. Tests under power frequency (IEC 60243-1.

2013, IDT);

---GB/T 1410-2006 Test method for volume resistivity and surface resistivity of solid insulating materials (IEC 60093.1980,

IDT);

---GB/T 2411-2008 Plastic and hard rubber using a hardness tester to determine the indentation hardness (Shore hardness) (ISO 868.2003,

IDT);

---GB/T 6031-2017 Determination of hardness of vulcanized rubber or thermoplastic rubber (10IRHD~100IRHD) (ISO 48.

2010, IDT);

---GB/T 9341-2008 Determination of bending properties of plastics (ISO 178.2001, IDT);

---GB/T 10064-2006 Test method for determining insulation resistance of solid insulating materials [IEC 60167. 1964 (1996),

IDT];

---GB/T 10580-2015 Standard conditions for the use of solid insulating materials before and during testing (IEC 60212.2010,

IDT);

--- GB/T 26168.1-2018 Electrical insulating materials to determine the effects of ionizing radiation - Part 1. Radiation interactions and agents

Measurement (IEC 60544-1.2013, IDT);

--- GB/T 26168.3-2010 Determination of the effects of ionizing radiation - Part 3. Application to radiation

Grading system (IEC 60544-4.2003, IDT).

This part was proposed by China Electrical Equipment Industry Association.

This part is under the jurisdiction of the National Technical Committee for Standardization of Electrical Insulation Materials and Insulation Systems (SAC/TC301).

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Introduction

When selecting the insulation used in a radiant environment, the designer needs to have reliable test data to compare the selected materials. for

In this way, performance data for each material can be obtained according to standardized test procedures that need to reflect changes in working conditions.

The impact of important performance. In particular, consider that the radiation dose rate is lower under normal working conditions, while the insulating material is based on the high dose rate.

The choice of materials obtained by the radiation resistance data obtained from the test.

It is often necessary to well control and record the environmental conditions during the measurement of the effects of radiation, important environmental parameters including the temperature during the radiation,

Should be medium and mechanical, electrical stress, etc. If air is present, the radiation-inducing agent may react with oxygen, if there is no air, it will not

This happens. This is why some polymers have an effect on the absorbed dose rate when exposed to air, resulting in

The actual radiation resistance of the material is lower than the radiation resistance of the sample under vacuum or inert gas. This condition is often referred to as "dose

The rate effect is described in detail in references [2-15].

Irradiation time can also be an important factor in the following situations.

a) diffusion limits the physical effects of oxidation [9], [11];

b) Determination of chemical phenomena such as hydrogen peroxide splitting reactions at dose rates [11], [15].

Typical diffusion-limiting effects are usually observed in the study of polymer radiation in air, and their importance depends on polymer geometry.

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The relationship between structure and oxygen permeation and consumption rate, and oxygen permeation and consumption rate are both dependent on temperature [11]. This means a thick test

Irradiation in the air may cause partial oxidation of the surface of the sample to the air, which in turn causes a change in the properties of the material (with an oxygen-free ring).

Similar in the case of irradiation in the environment). Therefore, when the material is to be used for a long time in a low dose rate air environment, the high dose rate of the sample is placed for a short time.

The durability may not be determined in the same dosage environment. Pass previous tests or sample thickness factors combined with oxygen permeability and consumption

Rates [9], [11] are estimated to avoid the above problems. A technique for effectively eliminating oxygen diffusion effects by increasing the surrounding oxygen pressure

Among them [9].

Radiation-induced reactions are affected by temperature, and increasing the rate of reaction by temperature can result in a synergistic effect between radiation and heat. In general heat

In the aging prediction, the Arrhenius method is usually used, which uses an equation based on basic chemical kinetics. Although there is currently a big

The amount of research on radiation aging methods, but the research in this field is relatively backward [10]. Used for aging test modeling including dose, time, Ale

The general equations such as Niu's activation energy, dose rate and temperature are currently being tested [11-13]. Need to be clear. successive

Continuous application of radiation and heat (usually used in practice) may result in significant differences in test results due to differences in application sequences, and

Their synergistic effects are often not well simulated [14], [15].

The mechanical and electrical properties required for insulating materials and the extent of acceptable radiation-induced changes are so varied that they are

The law gives a framework suggestion for acceptable performance. The same is true for irradiation conditions. Therefore this section only recommends a few based on previously validated

It is suitable for performance and irradiation conditions. The recommended properties are those that are particularly sensitive to radiation. For some special applications may have to

Choose other features.

GB/T 26168.1 specifies various issues involved in the evaluation of radiation effects, dose

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