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PEOPLE'S REPUBLIC OF CHINA**

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**Superconducting power devices -- General requirements for
characteristic tests of current leads designed for powering
superconducting devices**

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Foreword

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

This standard uses the translation method equivalent to IEC 61788-14..2010

"Superconductivity Part 14. Superconducting power supply device Superconducting device

General requirements for the test of supply current characteristics of the supply current ".

And the normative reference in this standard international documents are consistent with the relationship between China's documents are as follows.

GB/T 13811-2003 Electrical terminology Superconductivity (eqvIEC 60050-815..2000)

GB/T 311.1-2012 Insulation coordination Part 1. Definitions, principles and rules (IEC 60071-1..2006, MOD)

Insulation bushing with AC voltage higher than 1000V (IEC 60137Ed.6.0, MOD) GB/T 4109-2008

This standard is under the jurisdiction of National Superconducting Standardization Technical Committee (SAC/TC265).

The drafting of this standard. Institute of Electrical Engineering, Chinese Academy of Sciences, Tianjin University, North China Electric Power University, China Electric Power Research Institute, China Branch

Institute of Plasma Physics.

Introduction

Current leads are currently used in superconducting devices such as MRI diagnostic instruments, NMR spectrometers, single crystal growth devices, superconducting magnetic

Energy storage systems, particle accelerators (such as Tevatron, HERA, RHIC and LHC), nuclear fusion test equipment (such as ToreSupra,

TRIAM, LHD, EAST, KSTAR, W7-X, JT-60SA and ITER, etc.) and the superconducting devices to be put into practical use

Floating trains, superconducting current limiters, superconducting transformers) indispensable components.

The main function of the current lead is to provide a high current for the superconducting device while minimizing its overall heat load, from room temperature to low temperature

The heat of the environment and the current lead on the Joule heat. For this reason, the use of a high-temperature superconductor as a part of the current lead contributes to a significant reduction

Its overall heat load.

On the other hand, the current lead technology applied to the superconducting device depends on the specific requirements of each application, the manufacturer's experience

The accumulation of surgery. Since the current lead is only used as a component of the device, it is difficult to determine its compatibility, the flexibility to use between different devices,

Convenience and overall economy. Which will hinder the development of superconducting device technology and commercial applications, worthy of our attention.

Thus, the definition of the current lead used for the superconducting device is clearly defined and standardized by a series of general rules to normalize its general characteristics

Which will help to improve the current level of current lead.

Superconducting power supply device superconducting device supply current

General requirements for lead characteristics testing

1 Scope

This standard gives the superconducting device power supply traditional current lead and superconducting current lead characteristics of the general requirements of testing.

2 normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article

Pieces. For undated references, the latest edition (including all modifications) applies to this document.

IEC 60050-815..2000 International Electrotechnical Terms Superconductivity

[International Electrotechnical Vocabulary

(IEV) -Part 815. Superconductivity]

IEC 60071-1 Insulation coordination Part 1. Definitions, principles and rules

(Insulation coordination-Part 1. Defini-

tions, principles and rules)

IEC 60137 Insulated bushing with AC voltage higher than 1000V

(Insulated bushings for alternating voltages above

1000V)

3 terms and definitions

IEC 60050-815..2000 Definitions and the following terms and definitions apply to this document.

3.1

Current lead currentlead

In the insulation conditions, the current into the device conductor, especially the current from the room temperature into the low temperature also have a cooling channel.

[IEV815-06-47]

3.2

Conventional current lead normalconductingcurrentlead

Traditional current lead

Only the current conductors that make up the conductive part of the conventional conductor.

3.3

Superconducting current leads superconductingcurrentlead

Current lead with superconducting part.

Note. The superconducting current lead includes a conventional conductor portion from room temperature to an intermediate temperature, and a superconductor portion from an intermediate temperature to a low temperature environment. In this standard

The superconducting portion is usually made of a high temperature superconductor.

3.4

Non-air-cooled current lead non-gascooledtypecurrentlead

The current is cooled by conduction cooling.

3.5

Air-cooled current lead gas-cooling type current lead

A current lead cooled with a cryogenic gas.

NOTE. In some cases, air cooling is achieved by the flow of gas inside the lead and the way in which the gas is convected on its outer surface.