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

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**Critical current measurement -- DC critical current of Nb₃Sn
composite superconductors**

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Table of Contents

1 Scope	1
2 Normative references	1

Foreword

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

This standard is identical with IEC 61788-2:2006 "niobium three tin composite superconductors DC critical current measurement."

The IEC 61788-2 standard for individual entries appearing in editorial errors made changes.

Normative and standards of international documents correspondence between consistency of the following documents.

--- GB/T 13811-2003 Electrotechnical terminology superconductivity (IEC 60050-815:2000, MOD).

This standard by the National Standardization Technical Committee proposed superconductivity.

This standard by the National Standardization Technical Committee superconducting (SAC/TC265) centralized.

This standard is drafted by. Institute of Electrical Engineering.

Participated in the drafting of this standard. Western Superconducting Material Technology Co., Ltd., Chinese Academy of Sciences Institute of Physics, University of Science and Technology of China.

Introduction

The critical current of composite superconductors for superconducting wire applications design limits. Actual operating conditions superconductor decision many of its properties,

And this standard test method available to determine the suitability of a particular superconductor required partial information.

The use of the critical current value measured by this standard may also be used to detect composite superconductors due to manufacturing process changes, process, aging or make all sorts

And superconducting properties with changes caused by external factors. If compliance with this standard to the test specification, the measurement methods for quality control, Acceptance tests and research is very useful.

The critical current of composite superconductors affected by many factors. Testing and application of the material, it is necessary to give due consideration to these factors.

Test conditions, such as magnetic field, temperature and sample - current - relative orientation between the magnetic field and the like, to be determined depending on the application. Allowable error

Within the range, the test system to determine the configuration according to the situation of a particular sample. And specific critical current criteria determined according to the actual application status

set. If you have irregular situation tests, are advised by measuring the sample to obtain a certain number of test results.

The standard test methods mentioned are based on Cu/Nb-Ti (Cu/NbTi) composite superconductors DC critical current measurement (IEC 61788-1)

Test methods and VAMAS (Versailles advanced materials and standards) project (Nb₃Sn) composite superconductors critical current test on niobium trisnnoxane

Standardized preparations. And Cu/Nb-Ti (Cu/NbTi) composite superconductors as compared niobium three tin (Nb₃Sn) superconductors critical current for the machine

Mechanical strain is very sensitive, therefore, may affect the test sample strain state test procedures were modified, Appendix B describes these changes

Background.

Niobium three tin (Nb₃Sn) composite superconductors

DC critical current measurement

1 Scope

This standard also gives the usual test of this test method permitted deviations as well as other specifically defined.

The critical current is greater than 1000A or the total cross-sectional area greater than 2mm² niobium three tin (Nb₃Sn) superconductor can also use this method of measurement

Amount, it is expected that accuracy will be reduced, and since the field effect is more obvious (see Appendix C).

This test method is applicable to the determination method or the bronze in the production of copper, tin/copper ratio is greater than 0.2, the non-niobium three tin (Nb₃Sn) complex

DC critical current of superconductors together.

This test method is applicable to the standard test conditions critical current less than 1000A, n -value is greater than the superconductor 12 and the superconductor

Magnetic field is smaller than or equal to 0.7 times the upper critical magnetic field. During the measurement, the sample immersed in liquid helium at a known temperature. Tested

Try niobium three tin composite conductor having a circular cross section integrated structure, its cross-sectional area less than 2mm². The sample should be the induction coil geometry

shape. Furthermore, in order to maintain simplicity and precision of measurement, this standard does not address the large conductor cross-section may be more suitable for special sample

shape.

Measurement methods given in this standard in principle should also apply to the use of any other process of niobium three tin production of (Nb₃Sn) superconducting compound

line. After appropriate modifications, this method is also applicable to other types of desired compound superconducting wire.

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.

GB/T 13811-2003 Electrotechnical terminology superconductivity (eqv IEC 60050-815.2000)

3 Terms and Definitions

GB/T 13811-2003 defined and terms and definitions apply to this document.

3.1

Critical current criticalcurrent

I_c

In superconductors, it is considered to be the maximum DC current through unhindered.

NOTE. I_c is a function of temperature and magnetic field strength.

[GB/T 13811-2003 in 815-03-01]

3.2

The critical current criteria criticalcurrentcriterion

Ic criterion Iccriterion

rho criterion determining the critical current Ic according to electric field intensity E or resistivity.

Note. Commonly used as a criterion for the electric field strength $E = 10\mu\text{V/m}$ or $E = 100\mu\text{V/m}$, resistivity criterion is $\rho = 10\text{-}14\text{ohm} \cdot \text{m}$ or $\rho = 10\text{-}13\text{ohm} \cdot \text{m}$.

[GB/T 13811-2003 in 815-03-02]