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

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

临界电流测量 REBCO复合超导体的直流临界电流测量

(English Translation)

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Reference

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is equivalent to IEC 61788-26:2020 "Superconductivity Part 26: Critical current measurement of REBCO composite superconductors DC critical current measurement.

The following minimal editorial changes were made to this document.

---Change the file name to "Critical Current Measurement of REBCO Composite Superconductor DC Critical Current Measurement", and change the original file name "RE-Ba-Cu-O" is abbreviated as "REBCO";

--- Added "Note" in the scope of Chapter 1;

--- Added Note 1 and Note 2 in Section 6.2.

Introduction

In 1986, researchers discovered that some perovskite copper oxides exhibit superconductivity, with a transition temperature much higher than that of metallic superconductors.

In 1987, it was discovered that the critical temperature (T_c) of Y-Ba-Cu-O (YBCO) was 93 K. About 25 years later, RE-Ba-Cu-O (REBCO, RE= Commercial production of rare earth composite superconductors began.

In.2013, the Versailles Partnership for New Materials and Standards (VAMAS-TWA)16 began to study the critical properties of REBCO composite superconductors.

In.2014, VAMAS-TWA16 organized 10 institutions/universities/enterprises from 5 countries to carry out REB-International round-robin comparison of critical current measurement methods for CO composite superconductors. The pre-standardization work of VAMAS is the basis for this document.

At present, REBCO composite superconductors have entered the stage of commercial small-scale production, and more than 20 strip production companies around the world are engaged in the industrialization of REBCO composite superconductors has made important progress in the practical application of this type of material, with a single composite superconductor length of at the same time, several major high-temperature superconducting demonstration projects at home and abroad are also based on this Materials, such as superconducting cables from Jeju Island, South Korea, superconducting magnets for compact controlled nuclear fusion devices in the United States and the United Kingdom, and superconducting cables and limit Flow devices and induction heating projects.

The measurement method given in this document is intended to provide a reasonable and consensus technical basis for engineering and technical personnel in the field of superconducting technology.

Critical Current Measurement of DC in REBCO Composite Superconductors Critical current measurement

1 Scope

This document describes a method for measuring the DC critical current of short straight flat ribbon samples of RE-Ba-Cu-O (REBCO, RE = rare earth) composite superconductors.

The method gives the allowable deviation and other specific limitations of this method in normal measurements.

This document is applicable to samples with a length not exceeding 300 mm and a cross-sectional rectangular area of 0.03 mm² to 7.2 mm², equivalent to a width of the

composite superconductor has a thickness of 0.03mm~0.6mm and a thickness of 1.0mm~12.0mm. The I_c of the composite superconductor under standard measurement environment is not Greater than 300A, n-value greater than 5.

Note: The standard measurement environment means that during the measurement process, the sample to be measured is immersed in liquid nitrogen and there is no external magnetic field.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

cabulary(IEV)-Part 815: Superconductivity]

Note 1: GB/T 2900.100-2017 Electrical terminology Superconductivity (IEC 60050-815:2015, IDT)

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in IEC 60050-815 and the following apply.

The URLs for terminology databases used for standardization maintained by ISO and IEC are as follows.

Provide direct current to the sample at a constant rising rate, so that the current rises from zero to slightly greater than I_c , with continuous or certain sampling Method for frequency collection of UI data.

[Source. GB/T 18502-2018, 3.7] 3.2 Ramp-and-hold method Set multiple appropriate current distribution points along the UI curve so that the current rises from one set point to another and remains constant for a certain period of time.

A method of increasing the current to a set point to obtain UI data is used.

[Source. GB/T 18502-2018, 3.8]