ICS 77.040.01, 29.050
CCS H 21;K11

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 42472-2023

Critical current measurement - Retained critical current after double bending at room temperature of Ag-sheathed Bi-2223 superconducting wires

Issued on: March 17, 2023 **Implemented on: October 1, 2023**

Issued by: State Administration for Market Regulation, China National Standardization Administration

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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 61788-24:2018 "Superconductivity Part 24: Critical current measurement silver-coated Bi-2223 superconductor

Retained critical current after double bending of wire at room temperature":

The following minimal editorial changes have been made to this document:

---Changed from "Critical Current Measurement of Residual Critical Current of Silver-coated Bi-2223 Superconducting Strip after Double Bending at Room Temperature" to "Critical Current

Measuring the retained critical current after double bending of silver-coated Bi-2223 superconducting wires":

This document was proposed by the Chinese Academy of Sciences:

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

This document is drafted by: Institute of Electrical Engineering, Chinese Academy of

Sciences, Institute of Physics, Chinese Academy of Sciences, China Electric Power Research Institute Co:, Ltd:,

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Introduction

High-temperature superconductors have been discovered for more than 30 years: Because of their advantages such as high critical temperature and high current-carrying density, they have become the most important fields in the fields of electric power, electronics, transportation, etc:

important basic materials; with the national carbon peak and carbon neutral goals put forward, the development of new energy power technology has become an urgent need, superconducting

Materials and technologies are considered as optional basic materials and technologies in this technological change: At present, commercial high-temperature superconducting materials are mainly

YBCO and Bi-SCCO, among which Bi-2223 tape is the earliest commercialized first-generation high-temperature superconducting tape, used for superconducting magnets and superconducting power

There are many studies on equipment: The high critical temperature and thermal stability of Bi-2223 superconducting tape make it more suitable for weak magnetic field applications such as superconducting power cables:

use: Since the high-temperature superconducting material is an oxide ceramic, the mechanical properties are poor, although the commercialized superconducting strip is reinforced by metal alloy coating

Composite conductors have been made with advanced technology, which improves their mechanical properties, but there are still critical tensile and bending values: In the winding process of the superconducting device, the superconducting

The ribbon is inevitably bent or stretched, and the winding process is usually carried out at room temperature:

Sexuality is important:

This document covers two basic techniques, the critical current measurement and the double bending process:

Critical current measurement

Silver sheathed Bi-2223 superconducting wire after double bending at room temperature

reserve critical current

1 Scope

This document describes the test method for the critical current after double bending of Bi-2223 oxide superconductor short straight samples at room temperature: The sample is a flat

Single-core or multi-core silver and/or silver-coated superconducting wires of flat or square structure: Superconducting wires can be stacked with copper alloy, stainless steel or nickel alloy

Layer encapsulation:

This document applies to superconductors with critical currents less than 300A and n-values greater than 5: The test of the critical current after double bending at room temperature without

The samples were immersed in open liquid nitrogen under the condition of adding a magnetic field:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references

For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document:

vocabulary(IEV)-Part 815:Superconductivity)

Note: GB/T 2900:100-2017 Electrotechnical Terminology Superconductivity (IEC 60050-815:2015, IDT)

3 Terms and Definitions

IEC 60050-815 and the following terms and definitions apply to this document: Terminology maintained by ISO and IEC for standardization

Database, the address is as follows:

---ISO online browsing platform: available from http://www:iso:org/obp

3:1

double bending doublebending

Bend to a certain diameter in one direction, then bend to the same diameter in the opposite direction:

Note 1: The bending diameter is defined as the diameter of the bending mandrel:

Note 2: The bending diameter is defined in principle as the sum of the mandrel diameter and the thickness of the superconductor: But in engineering, it is also necessary to consider the minimum diameter of the roller that the superconducting wire passes through:

3:2

Provide a direct current to the sample at a constant rate of rise, so that the current rises from zero to slightly greater than the critical current Ic, and at the same time continuously or

A method of collecting UI data at a certain sampling frequency:

3:3

Ramp-and-hold method

Set multiple appropriate current distribution points along the UI curve, so that after the current rises from one set point to another, it remains constant:

Constant current for a period of time, while recording several corresponding current and voltage values, and then continue to increase the current to subsequent set points to obtain UI data: