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**Matrix to superconductor volume ratio measurement -- Copper
to non-copper volume ratio of Nb (3) Sn composite
superconducting wires**

基体与超导体体积比测试 Nb₃Sn复合超导线铜与非铜体积比

(English Translation)

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Foreword

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

The use of translation method is equivalent to using the standard IEC 61788-12:2013 (Ed.2.0) "Superconductivity - Part 12. matrix and superconductor body Volume ratio test Nb₃Sn composite superconducting wires of copper and non-copper volume ratio. "

Correspondence between the consistency of the standards of international documents and normative references of the following documents.

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

--- GB/T 22587-2008 matrix and superconductor volume ratio measurement of Cu/Nb-Ti composite superconductors copper - Ultra [volume] measured ratio Amount (IEC 61788-5:2000, MOD).

Please note that some of the content of this document may involve patents. Release mechanism of the present document does not assume responsibility for the identification of

these patents.

This standard was proposed by the Chinese Academy of Sciences.

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

This standard was drafted. Western superconducting materials Technology Co., Ltd., Institute of Physics, Northwest Nonferrous Metal Research Institute, Beijing Nonferrous Metal Research Institute.

Introduction

Copper and non-copper volume ratio of superconducting wire two important features characterizing parameters, an important parameter that is the critical current density and stability of the wire.

The standard specification of copper stabilizing material multi-core Nb₃Sn composite superconducting wires (hereinafter referred to as Cu/Nb₃Sn wire) copper and non-copper volume ratio Test Methods.

Depending on the layout of stabilizing material, Cu/Nb₃Sn wire can be divided into four categories (see Appendix G). outside the stable, in the stable, dispersion Stereotypes around stable. Test methods specified in this standard applies to all kinds of external processing technology made stabilized or stable inner wire.

These test methods include paper weighing method, image processing methods, such as.

Paper weighing method, this method requires the wire cross-sectional pictures described in the paper copy or tracing paper, then cut and weighed the different parts.

Image processing method, this method uses software to analyze the photo on the wire cross section.

Copper mass method, this method uses nitric acid to dissolve and remove a sample of copper only non-copper portion, measuring quality and non-copper part of the quality of the sample.

Within stable Cu/Nb₃Sn wire with a copper matrix Nb-Ti line is different, it is not suitable for copper Quality Act, because it interferes with the internal structure Hinder dissolve and remove copper.

The body of the standard involved are the most commonly used paper weighing method. Other methods Cu/Nb₃Sn wire applicable, an image processing method and copper Quality Act are in Appendix A and Appendix B in the introduction, Appendix C describes the planimeter method described in Appendix D is a method of polishing Instance.

Matrix and superconductor volume ratio test Nb₃Sn composite superconducting wires of

copper and non-copper volume ratio

1 Scope

This standard specifies the test methods Cu/Nb₃Sn wire copper and non-copper volume ratio.

This standard applies to the cross sectional area of $0.1\text{mm}^2 \sim 3.0\text{mm}^2$, copper and non-copper volume ratio greater than or equal to 0.1 Nb₃Sn composite super wire. The standard diameter of the core wire is not required, but not for Sn, Cu-Sn alloy, the barrier material or other non-copper portions dispersed Copper matrix superconducting wire, not suitable for stabilizing the superconducting wire material is dispersed. In addition, copper and non-copper volume ratio measured in Nb₃Sn A phase before or after the heat treatment can be performed (see Appendix E).

The standard of Cu/Nb₃Sn wire has an integral structure circular or rectangular cross-section.

Despite the uncertainty increased cross-sectional area of the standard test method for copper and non-copper volume ratio beyond the standard range Cu/Nb₃Sn wires are also suitable.

The appropriate modifications, test methods given in this standard may be applied to other composite 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.

IEC 60050-815 International Electrotechnical Vocabulary - Part 815. Superconductivity (Internationalelectrotechnical vocabulary-Part 815. Superconductivity) IEC 61788-5 Superconductivity - Part 5. matrix and superconductor volume ratio measurement of Cu/Nb-Ti composite superconductors copper - Ultra [body Product] ratio measurement (Superconductivity-Part 5.

Matrix to superconductor volume ratio measurement - Copper to superconductor volume ratio of Cu/Nb-Ti composite superconductors)

3 Terms and Definitions

And the following terms and definitions as defined in IEC 60050-815 apply to this document.

Copper and non-copper volume ratio copper to non-copper volume ratio Cu/Nb₃Sn wire copper and non-copper volume ratio is defined as the ratio of the volume of material such

as copper wire and stable region and the non-wire copper area.

Principle 4

This standard uses the principle of the method is described as follows. The optical microscope to take a cross section of the wire samples polished photos and on tracing paper Depicts or use a copy machine. Then press area cut and measure the different parts of the mass, and then calculate the copper and non-copper volume ratio.

5 Device

Needed for testing apparatus comprising.