

Superconductivity —

Part 12: Matrix to superconductor volume ratio measurement — Copper to non-copper volume ratio of Nb₃Sn composite superconducting wires

The European Standard EN 61788-12:2002 has the status of a
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National foreword

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Part 12: Matrix to superconductor volume ratio measurement -
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Supraconductivité
Partie 12: Mesure du rapport volumique
matrice/supraconducteur -
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Verhältnis des Kupfervolumens
zum kupferfreien Volumen von
Nb₃Sn-Verbundsupraleiterdrähten
(IEC 61788-12:2002)

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

The text of document 90/123/FDIS, future edition 1 of IEC 61788-12, prepared by IEC TC 90, Superconductivity, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61788-12 on 2002-10-01.

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Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, B, C and ZA are normative and annexes D, E, F and G are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61788-12:2002 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

The copper to non-copper volume ratio of superconducting wires serves as an important numeric value used when determining the critical current density and its stability, which are two of the important characteristics of superconducting wires. This test method is concerned with the standardization of the test method for the copper to non-copper volume ratio of copper stabilized Nb₃Sn multi-filamentary composite superconducting wires (hereinafter referred to as Cu/Nb₃Sn wires).

Cu/Nb₃Sn wires can be classified into four types according to the layout of the stabilizer as shown in Annex G: the external stabilizer type, the internal stabilizer type, the distributed stabilizer type and the contiguous stabilizer with distributed barrier type. The test method specified by this standard may be applicable to a type whose cross-section is of the external stabilizer or the internal stabilizer type regardless of the production process employed.

With regard to the internal stabilizer type, the internal structure of some Cu/Nb₃Sn wires prevents copper from being dissolved and removed. This defies the application of the copper mass method, unlike with copper matrix Nb-Ti superconducting wires. New methods are therefore needed, as detailed in the following:

- the paper mass method, where a photo of the cross-section of the wire being measured is traced onto tracing paper, or a copy is made of the photo using a copying machine; the paper is then cut out into different portions to measure the mass of each piece of paper;
- the image processing method, where the image of the photo of the cross-section is digitized and the areas are analyzed with software;
- the planimeter method, where the cross-sectional areas are measured with a planimeter.

This standard is concerned with the paper mass method which is adopted more generally. As supplementary methods, the image processing method and the copper mass method adopted for Cu/Nb₃Sn wires are specified in Annex A and Annex B, respectively. The method using a planimeter is specified in Annex C. In Annex D an example of a polishing method is also specified.