SLOVENSKI STANDARD
SIST EN 61788-12:2014

01-januar-2014

Nadomešča:
SIST EN 61788-12:2003

Superprevodnost - 12. del: Matrika za merjenje superprevodniškega volumenskega razmerja - Razmerje med bakrom in nebakrenim volumenskim razmerjem superprevodnih žic iz kompozita Nb3Sn

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

Supraleitfähigkeit - Teil 12: Messung des Verhältnisses von Matrixvolumen zu Supraleitervolumen – Verhältnis des Kupfervolumens zum kupferfreien Volumen von Nb3Sn-Verbundsupraleiterdrähten

Supraconductivité - Partie 12 : Mesure du rapport volumique matrice/supraconducteur - Rapport volumique cuivre/non-cuivre des fils en composite supraconducteur Nb3Sn

Ta slovenski standard je istoveten z: **EN 61788-12:2013**

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities
29.050	Superprevodnost in prevodni materiali	Superconductivity and conducting materials

SIST EN 61788-12:2014 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61788-12

October 2013

ICS 29.050

Supersedes EN 61788-12:2002

English version

Superconductivity - Part 12: Matrix to superconductor volume ratio measurement - Copper to non-copper volume ratio of Nb_3Sn composite superconducting wires

(IEC 61788-12:2013)

Supraconductivité -
Partie 12 : Mesure du rapport volumique matrice/supraconducteur -
Rapport volumique cuivre/non-cuivre des fils en composite supraconducteur Nb_3Sn
(CEI 61788-12:2013)

Supraleitfähigkeit -
Teil 12: Messung des Verhältnisses von Matrixvolumen zu Supraleitervolumen -
Verhältnis des Kupfervolumens zum kupferfreien Volumen von Nb_3Sn-Verbundsupraleiterdrähten
(IEC 61788-12:2013)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61788-12:2013 E

Foreword

The text of document 90/322/FDIS, future edition 2 of IEC 61788-12, prepared by IEC/TC 90 "Superconductivity" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61788-12:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-04-17
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-07-17

This document supersedes EN 61788-12:2002.

EN 61788-12:2013 includes the following significant technical changes with respect to EN 61788-12:2002:

The main revision is the addition of two new annexes, "Uncertainty considerations" (Annex H) and "Uncertainty evaluation in the test method of the copper to non-copper volume ratio of Nb_3Sn composite superconducting wires" (Annex I).

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Endorsement notice

The text of the International Standard IEC 61788-12:2013 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60050	Series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 61788-5	-	Superconductivity - Part 5: Matrix to superconductor volume ratio measurement - Copper to superconductor volume ratio of Cu/Nb-Ti composite superconductors	EN 61788-5	-

IEC 61788-12

Edition 2.0 2013-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Superconductivity –

Part 12: Matrix to superconductor volume ratio measurement – Copper to non-copper volume ratio of Nb_3Sn composite superconducting wires

Supraconductivité –
Partie 12: Mesure du rapport volumique matrice/supraconducteur – Rapport volumique cuivre/non-cuivre des fils en composite supraconducteur Nb_3Sn

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 61788-12 has been prepared by IEC technical committee 90: Superconductivity.

This second edition cancels and replaces the first edition published in 2002. It constitutes a technical revision. The main revision is the addition of two new annexes, "Uncertainty considerations" (Annex H) and "Uncertainty evaluation in the test method of the copper to non-copper volume ratio of Nb_3Sn composite superconducting wires" (Annex I).

The text of this standard is based on the following documents:

FDIS	Report on voting
90/322/FDIS	90/325/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61788 series, published under the general title *Superconductivity,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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 standard is concerned with the standardization of the test method for the copper to non-copper volume ratio of copper stabilized Nb_3Sn multi-filamentary composite superconducting wires (hereinafter referred to as Cu/Nb_3Sn wires).

Cu/Nb_3Sn 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/Nb_3Sn wires prevents copper from being dissolved and removed. This precludes 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 copper mass method, where the copper of the specimen is dissolved in nitric acid solution to leave only the non-copper portion, and to measure the mass of the specimen and the non-copper portion of specimen.

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/Nb_3Sn 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.