SLOVENSKI STANDARD

SIST EN 61788-4:2008

01-januar-2008

Nadomeġļ a:

SIST EN 61788-4:2002

Superprevodnost - 4. del: Meritve razmerja preostale upornosti - Preostala upornost za superprevodnike iz kompozita Nb-Ti (IEC 61788-4:2007)

Superconductivity - Part 4: Residual resistance ratio measurement - Residual resistance ratio of Nb-Ti composite superconductors

Supraleitfähigkeit - Teil 4: Messungen des Restwiderstandsverhältnisses – Restwiderstandsverhältnis von Nb-Ti-Verbundsupraleitern

Supraconductivité - Partie 4: Mesure de la résistivité résiduelle - Taux de résistivité résiduelle des supraconducteurs composites au Nb-Ti

Ta slovenski standard je istoveten z: **EN 61788-4:2007**

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 61788-4:2008 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61788-4

July 2007

ICS 17.220.20; 29.050

Supersedes EN 61788-4:2001

English version

Superconductivity - Part 4: Residual resistance ratio measurement - Residual resistance ratio of Nb-Ti composite superconductors

(IEC 61788-4:2007)

Supraconductivité -
Partie 4: Mesure
de la résistivité résiduelle -
Taux de résistivité résiduelle
des supraconducteurs composites
au Nb-Ti
(CEI 61788-4:2007)

Supraleitfähigkeit -
Teil 4: Messungen
des Restwiderstandsverhältnisses –
Restwiderstandsverhältnis
von Nb-Ti-Verbundsupraleitern
(IEC 61788-4:2007)

This European Standard was approved by CENELEC on 2007-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 90/203/FDIS, future edition 2 of IEC 61788-4, prepared by IEC TC 90, Superconductivity, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61788-4 on 2007-07-01.

This European Standard supersedes EN 61788-4:2001.

The main revisions are the replacement of "accuracy" by "uncertainty" and a change in Figure 1, where the relationship between temperature and voltage is changed to the relationship between temperature and resistance.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2008-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2010-07-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61788-4:2007 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 referenced documents are indispensable for the application of this document. 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 60050-815	- [1)]	International Electrotechnical Vocabulary (IEV) - Part 815: Superconductivity	-	-

[1)] Undated reference.

INTERNATIONAL STANDARD

IEC 61788-4

Second edition
2007-04

Superconductivity –

Part 4: Residual resistance ratio measurement – Residual resistance ratio of Nb-Ti composite superconductors

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE T

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SUPERCONDUCTIVITY –

Part 4: Residual resistance ratio measurement – Residual resistance ratio of Nb-Ti composite superconductors

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61788-4 has been prepared by IEC technical committee 90: Superconductivity.

This second edition cancels and replaces the first edition published in 2001. It constitutes a technical revision. The main revisions are the replacement of "accuracy" by "uncertainty" and a change in Figure 1, where the relationship between temperature and voltage is changed to the relationship between temperature and resistance.

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

FDIS	Report on voting
90/203/FDIS	90/205/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 maintenance result 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.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

Copper is used as a matrix material in multifilamentary superconductors and works as an electrical shunt when the superconductivity is interrupted. It also contributes to recovery of the superconductivity by conducting heat generated in the superconductor to the surrounding coolant. The cryogenic-temperature resistivity of copper is an important quantity, which influences the stability of the superconductor. The residual resistance ratio is defined as a ratio of the resistance of the superconductor at room temperature to that just above the superconducting transition.

In this International Standard, the test method of residual resistance ratio of Nb-Ti composite superconductors is described. The curve method is employed for the measurement of the resistance just above the superconducting transition. Other methods are described in Clause A.4.

SUPERCONDUCTIVITY –

Part 4: Residual resistance ratio measurement – Residual resistance ratio of Nb-Ti composite superconductors

1 Scope

This part of IEC 61788 covers a test method for the determination of the residual resistance ratio (*RRR*) of a composite superconductor comprised of Nb-Ti filaments and Cu, Cu-Ni or Cu/Cu-Ni matrix. This method is intended for use with superconductors that have a monolithic structure with rectangular or round cross-section, *RRR* less than 350, and cross-sectional area less than 3 mm^2. All measurements are done without an applied magnetic field.

The method described in the body of this standard is the “reference” method and optional acquisition methods are outlined in Clause A.4.

2 Normative references

The following referenced document is indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-815, *International Electrotechnical Vocabulary (IEV) – Part 815: Superconductivity*

3 Terms and definition

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

residual resistance ratio
RRR
the ratio of resistance at room temperature to the resistance just above the superconducting transition.

In this standard for Nb-Ti composite superconductors, the room temperature is defined as 20 °C, and the residual resistance ratio is obtained in equation (1) below where the resistance (R_1) at 20 °C is divided by the resistance (R_2) just above the superconducting transition.

$$RRR = \frac{R_1}{R_2} \tag{1}$$

Figure 1 shows schematically a resistance versus temperature curve acquired on a specimen while measuring the cryogenic resistance. Draw a line in Figure 1 where the resistance sharply increases (a), and draw also a line in Figure 1 where the temperature increases but the resistance remains almost the same (b). The value of resistance at the intersection of these two lines, A, is defined as resistance (R_2) just above the superconducting transition.