



**SLOVENSKI STANDARD**  
**SIST EN 61788-1:2001**  
**01-september-2001**

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**Superconductivity - Part 1: Critical current measurement - DC critical current of Cu/Nb-Ti composite superconductors**

Superconductivity -- Part 1: Critical current measurement - DC critical current of Cu/Nb-Ti composite superconductors

Supraleitfähigkeit -- Teil 1: Messen des kritischen Stromes - Kritischer Strom (Gleichstrom) von Cu/Nb-Ti-Verbundsupraleitern

Supraconductivité -- Partie 1: Mesure du courant critique - Courant critique continu de supraconducteurs en composite Cu/Nb-Ti

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**Ta slovenski standard je istoveten z: EN 61788-1:1998**

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**ICS:**

17.220.20	Measurement of electrical and magnetic quantities
29.050	Superconductivity and conducting materials

**SIST EN 61788-1:2001**

**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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April 1998

ICS 29.050

English version

**Superconductivity**  
**Part 1: Critical current measurement**  
**DC critical current of Cu/Nb-Ti composite superconductors**  
**(IEC 61788-1:1998)**

Supraconductivité  
Partie 1: Mesure du courant critique  
Courant critique continu de  
supraconducteurs en composite  
Cu/Nb-Ti  
(CEI 61788-1:1998)

Supraleitfähigkeit  
Teil 1: Messen des kritischen Stromes  
Kritischer Strom (Gleichstrom) von  
Cu/Nb-Ti-Verbundsupraleitern  
(IEC 61788-1:1998)

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**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 90/44/FDIS, future edition 1 of IEC 61788-1, prepared by IEC TC 90, Superconductivity, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61788-1 on 1998-04-01.

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) 1999-01-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2001-01-01

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

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative and annexes A and B are informative.

Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the International Standard IEC 61788-1:1998 was approved by CENELEC as a European Standard without any modification.

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**Annex ZA (normative)****Normative references to international publications  
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-815	- <sup>1)</sup>	International Electrotechnical Vocabulary (IEV) Chapter 815: Superconductivity	-	-

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**NORME  
INTERNATIONALE  
INTERNATIONAL  
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**61788-1**

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1998-02

**Supraconductivité –**

**Partie 1:**

**Mesure du courant critique –**

**Courant critique continu de supraconducteurs  
en composite Cu/Nb-Ti**

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**Superconductivity –**

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**Critical current measurement –**

**DC critical current of Cu/Nb-Ti composite  
superconductors**

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International Electrotechnical Commission  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SUPERCONDUCTIVITY –

**Part 1: Critical current measurement –  
DC critical current of Cu/Nb-Ti composite superconductors**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61788-1 has been prepared by IEC technical committee 90: Superconductivity.

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

FDIS	Report on voting
90/44/FDIS	90/45/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.

Annexes A and B are for information only.

## INTRODUCTION

The critical currents of composite superconductors are used to establish design limits for applications of superconducting wires. The operating conditions of superconductors in these applications determine much of their behaviour, and tests made with the method given in this part of IEC 61788 may be used to provide part of the information needed to determine the suitability of a specific superconductor.

Results obtained from this method may also be used for detecting changes in the superconducting properties of a composite superconductor due to processing variables, handling, ageing or other applications or environmental conditions. This method is useful for quality control, acceptance or research testing, if the precautions given in this standard are observed.

The critical current of composite superconductors depends on many variables. These variables need to be considered in both the testing and the application of these materials. Test conditions such as magnetic field, temperature and relative orientation of the specimen, current and magnetic field are determined by the particular application. The test configuration may be determined by the particular conductor through certain tolerances. The specific critical current criterion may be determined by the particular application. It may be appropriate to measure a number of test specimens if there are irregularities in testing.

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## SUPERCONDUCTIVITY –

### Part 1: Critical current measurement – DC critical current of Cu/Nb-Ti composite superconductors

#### 1 Scope

This part of IEC 61788 covers a test method for the determination of the d.c. critical current of Cu/Nb-Ti composite superconductors that have a copper/superconductor ratio larger than 1.

This method is intended for use with superconductors that have critical currents less than 1 000 A and  $n$ -values larger than 12, under standard test conditions and at magnetic fields less than or equal to 0,7 of the upper critical magnetic field. The test specimen is immersed in a liquid helium bath during testing. The Cu/Nb-Ti composite test conductor has a monolithic structure with a round or rectangular cross-sectional area that is less than 2 mm<sup>2</sup>. The specimen geometry used in this test method is an inductively coiled specimen. Deviations from this test method that are allowed for routine tests and other specific restrictions are given in this standard.

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Cu/Nb-Ti conductors with critical currents above 1 000 A or cross-sectional areas greater than 2 mm<sup>2</sup> could be measured with the present method with an anticipated reduction in precision and a more significant self-field effect (see annex B). Other, more specialized, specimen test geometries may be more appropriate for larger conductor testing which have been omitted from this present standard for simplicity and to retain precision.

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The test method given in this standard is expected to apply to other superconducting composite wires after some appropriate modifications.

#### 2 Normative references

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of IEC 61788. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 61788 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050-815, — *International Electrotechnical Vocabulary (IEV) – Chapter 815: Superconductivity* <sup>1)</sup>

<sup>1)</sup> To be published.