IEC 61788-22-1

Edition 1.0 2017-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Superconductivity – Part 22-1: Superconducting electronic devices – Generic specification for sensors and detectors

Supraconductivité – Partie 22-1: Dispositifs électroniques supraconducteurs – Spécification générique pour les capteurs et détecteurs

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CONTENTS

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SUPERCONDUCTIVITY –

Part 22-1: Superconducting electronic devices – Generic specification for sensors and detectors

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International Standard IEC 61788-22-1 has been prepared by IEC technical committee 90: Superconductivity.

This bilingual version (2019-08) corresponds to the monolingual English version, published in 2017-07.

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

FDIS	Report on voting
90/388/FDIS	90/391/RVD

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

The French version of this standard has not been voted upon.

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

A list of all parts in 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

Superconductivity offers various possibilities for the realization of sensing and detection of a variety of measurands. Several sensors and detectors have been developed, exploiting features like superconducting energy gaps, sharp normal-superconducting transition, nonlinear I–V characteristics, superconducting coherent states, and quantization of magnetic flux. All these properties can be influenced by the interaction with electromagnetic fields, photons, ions, etc. Superconducting sensors and detectors have extremely high performance for energy resolution, time response, and low noise, most of which cannot be realized by any other phenomena.

The word "sensor" is normally used for measuring stationary or slowly changing electromagnetic fields, physical quantities such as current and temperature. On the other hand, the word "detector" is normally used for single quanta such as photons from infrared to γ-rays and individual particles. However, the boundary between "sensor" and "detector" is ambiguous. In this document, therefore, both "sensor" and "detector" are used. Additionally, a detector using a sensor is possible, for example, X-ray detector using transition edge sensor (TES) that measures temperature rise due to the deposition of measurand energy. In this document, for example, the terminology "transition edge sensor X-ray detector" is used for X-ray detection using TES.

Superconducting sensors and detectors have been applied to a variety of fields including medical diagnosis, telecommunications, mineral exploration, astronomical instruments, quantum information processing, and analytical instruments. For users, IEC standardization is necessary because there is confusing terminology, there are no graphical symbols for diagrams, and no test methods.

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SUPERCONDUCTIVITY –

Part 22-1: Superconducting electronic devices – Generic specification for sensors and detectors

1 Scope

This part of IEC 61788-22-1 describes general items concerning the specifications for superconducting sensors and detectors, which are the basis for specifications given in other parts of IEC 61788 for various types of sensors and detectors. The sensors and detectors described are basically made of superconducting materials and depend on superconducting phenomena or related phenomena. The objects to be measured (measurands) include magnetic fields, electromagnetic waves, photons of various energies, electrons, ions, α-particles, and others.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60027 (all parts), *Letter symbols to be used in electrical technology*

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

IEC 60417, *Graphical symbols for use on equipment* (available at: http://www.graphical-symbols.info)

IEC 60617, *Graphical symbols for diagrams* (available at: http://std.iec.ch/iec60617)

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols* (available at: http://www.graphical-symbols.info)

3 Terms and definitions

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