SLOVENSKI STANDARD
oSIST prEN IEC 61788-29:2026

01-september-2026

Merjenje elektromehanskih lastnosti - Elektromehanski preskus praktičnih kompozitnih superprevodnikov rebco in bscco pri temperaturi tekočega dušika

Electromechanical properties measurement - Electromechanical test of practical rebco and bscco composite superconductors at liquid nitrogen temperature

Ta slovenski standard je istoveten z: **prEN IEC 61788-29:2026**

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

oSIST prEN IEC 61788-29:2026 **en**

90/563/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61788-29 ED1**	
DATE OF CIRCULATION: **2026-07-10**	CLOSING DATE FOR VOTING: **2026-10-02**
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IEC TC 90 : SUPERCONDUCTIVITY	
SECRETARIAT: Japan	SECRETARY: Mr Hideki II
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL FUNCTION(S):
ASPECTS CONCERNED:	
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TITLE:

Superconductivity – Part 29: Electromechanical properties measurement – Electromechanical test under uniaxial tensile load of REBCO and BSCCO composite superconductor tapes at liquid nitrogen temperature

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SUPERCONDUCTIVITY – Part 29: Electromechanical properties measurement – Electromechanical test under uniaxial tensile load of REBCO and BSCCO composite superconductor tapes at liquid nitrogen temperature

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The text of this International Standard is based on the following documents:

Draft	Report on voting
90/XX/CD	90/537/RVN

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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- withdrawn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

INTRODUCTION

Several types of composite superconductors have now been commercialized. The rare-earth-based oxide superconductor (SC) with the chemical formula $RE_1Ba_2Cu_3O_{7-\delta}$ is used in practical SC tapes, where

the rare-earth element RE is Y, Dy, Gd, Eu, Nd, Ho, and Sm or a mixture of them. This type of practical SC tape is usually called a REBCO coated conductor. A typical architecture consists of a substrate of Hastelloy, Ni-W alloy, or stainless steel, a buffer layer consisting of plural oxides, an SC layer, protection layers of Ag, and electroplated copper layers. The substrate and buffer layers act as templates to facilitate the well-oriented crystal grains of the SC layer. To resist the strong electromagnetic force, the tapes are in some cases externally reinforced by laminating thin foils of stainless steel, copper, or a copper alloy.

Two types of bismuth–based oxide superconductors with the chemical formula $(Bi, Pb)_2Sr_2Ca_{n-1}Cu_nO_{2n+4}$ where n = 2 or 3, have been developed as practical SC tapes/wires. In either case, superconducting filaments are embedded in a pure silver matrix. This type of practical SC tape/wire is usually called BSCCO tape/wire. In the Bi-2223 tapes/wires, a silver alloy outer sheath surrounds the matrix to increase mechanical strength. They are made exclusively in a flat tape-shaped form. Tapes are commercially available in which thin metallic sheets of copper alloy, stainless steel, or nickel alloy are soldered on both sides of the SC tapes to improve the stress dependence of critical current and the mechanical properties.

Practical composite superconductors have a high current density and a small cross-sectional area. The major application of composite superconductors is to build electrical power devices and superconducting magnets. While the magnet is being manufactured, complex stresses/strains are applied to its windings, and when it is energized, a large electromagnetic force is applied to the superconducting tapes due to their high current density. It is therefore indispensable to determine the electromechanical properties of the practical SC tapes at cryogenic temperatures.

SUPERCONDUCTIVITY –

Part 29: Electromechanical properties measurement – Electromechanical test under uniaxial tensile load of REBCO and BSCCO composite superconductor tapes at liquid nitrogen temperature

1 Scope

This part of IEC 61788 specifies a stress-based tensile test method for determining the electromechanical properties of practical REBCO and BSCCO composite superconductor tapes at liquid nitrogen temperature by measuring the critical current (I_c) under uniaxial tensile loading without the use of extensometers. This stress-based test method is intended to determine the irreversible stress limits for I_c degradation under tensile loading.

When REBCO tapes are tested using this procedure, they are a rectangular cross-section with an area of 0,06 mm^2 to 5,0 mm^2 (corresponding to tapes 2,0 mm to 12,5 mm in width and 0,03 mm to 0,4 mm in thickness). When BSCCO tapes are tested, they are a rectangular cross-section with an area of 0,3 mm^2 to 2,5 mm^2 (corresponding to tape-shaped ones 2,0 mm to 5,0 mm in width and 0,15 mm to 0,5 mm in thickness).

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 60050-815:2024, *International Electrotechnical Vocabulary (IEV) – Part 815: Superconductivity*

IEC 61788-26, Ed. 1: *Superconductivity - Part 26: Critical current measurement – DC critical current of RE-Ba-Cu-O composite superconductors*

IEC 61788-28, CDV: *Superconductivity – Part 28: Mechanical properties measurement – Tensile test of practical REBCO and BSCCO composite superconductors at cryogenic temperatures*

ISO 376:2011, *Metallic materials – Calibration of force-proving instruments used for the verification of uniaxial testing machines*

ISO 7500-1:2018, *Metallic materials – Calibration and verification of static uniaxial testing machines – Part 1: Tension/compression testing machines – Calibration and verification of the force-measuring system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-815 and ISO 6892, as well as the following, apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
tensile stress
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Tensile force divided by the original cross-sectional area (S_o) of the test piece at any moment during the test.