



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Methods of measurement of amorphous and nanocrystalline
alloys - Part 3: AC magnetic properties of Fe-based amorphous
strip using a single sheet specimen**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents"

Drafting.

This document is the third part of GB/T 19346 "Amorphous Nanocrystalline Alloy Test Method". GB/T 19346 has released the following

section.

---Part 1.AC magnetic properties of ring specimens;

---Part 2.Strip lamination factor;

---Part 3.AC magnetic properties of iron-based amorphous monolithic samples.

The translation method used in this document is equivalent to the IEC 60404-16.2018

“Magnetic Materials Part 16.Measurement of Iron-Based

Method for the magnetic properties of wafers (strips)".

The Chinese documents that have consistent correspondence with the normatively cited international documents in this document are as follows.

---GB/T 9637-2001 Electrotechnical terminology, magnetic materials and components (eqvIEC 60050-221.1990);

---GB/T 2900.60-2002 Electrotechnical terminology electromagnetics (eqvIEC 60050-121.1998);

---GB/T 19345.1-2017 Amorphous and nanocrystalline alloys Part 1.Iron-based amorphous soft magnetic alloy strips (IEC 60404-8-

11.2017, NEQ).

This document has made the following editorial changes.

---Incorporated the revised content of IEC 60404-16COR1.2018, revised formula (2) and formula (3), and used vertical

Double line (||) logo;

---In order to be consistent with the existing document series, the document name is changed to "Amorphous Nanocrystalline Alloy Test Method Part 3.Iron-based Amorphous Single

AC magnetic properties of sheet samples";

---Added informative appendix NA, test report.

Introduction

GB/T 19346 "Test Method for Amorphous and Nanocrystalline Alloys" currently consists of three parts.

---Part 1.AC magnetic properties of ring specimens;

---Part 2.Strip lamination factor;

---Part 3.AC magnetic properties of iron-based amorphous monolithic samples.

As a new type of material that is expected to reduce transformer core loss and slow down global warming, iron-based amorphous alloy strips require a

Magnetic properties measurement method to achieve its classification.

Iron-based amorphous alloy strips are produced through rapid solidification and direct casting processes, and are mainly used to produce power frequency (50Hz and 60Hz)

Used distribution transformer core.

After proper heat treatment, its specific total loss is significantly lower than that of oriented electrical steel strip (sheet). And has a low

Low hysteresis loss due to magnetic anisotropy, and low eddy current loss due to high resistivity and reduced thickness. However, due to the material

With high magnetostriction and low magnetic anisotropy, its performance will be significantly degraded due to applied stress.

Therefore, a method for measuring the magnetic properties of iron-based amorphous alloy strips with a single-chip tester (SST) is needed, which is different from the special electrical steel sheet.

Standard IEC 60404-3[1]1).

1) The numbers in square brackets refer to references.

The power meter method that is almost completely applicable is used in this document, but the common method of measuring the magnetic field strength with magnetizing current (MC method) is not

It is suitable for this material, because the yoke has a great influence on loss measurement for thinner and softer samples. So the introduction of

H-coil (H-coil method) is a power meter method for measuring magnetic field strength. International testing has been carried out for SST and Fe-based amorphous alloy strip samples.

Ring test, and derived SST structure suitable for amorphous alloy materials. In order to avoid this kind of high magneto-elastic material and the upper yoke

For the impact of collision, a single yoke design is adopted.

Amorphous nanocrystalline alloy test method

Part 3.AC magnetic properties of iron-based amorphous monolithic samples

1 Scope

This document is applicable to the measurement of AC magnetic properties of amorphous alloy strips at a frequency not higher than 400 Hz.

This document provides the basic principles and technical requirements for measuring the magnetic properties of amorphous alloy strips with a monolithic tester.

The monolithic tester specified in this document is suitable for testing each under the specified frequency and peak magnetic polarization intensity and the induced voltage is sinusoidal.

The AC magnetic properties of samples made of various types of amorphous alloy strips were measured.

The measurement should be carried out at an ambient temperature of $(23\pm 5)^{\circ}\text{C}$.

Note 1.The monolithic tester in this document can also be used to measure other materials with similar magnetic and physical properties as amorphous alloy strips, such as Permalloy Alloy strip, nanocrystalline alloy, etc. The method for measuring the magnetic properties of electrical steel strips (sheets) with a monolithic tester is specified by IEC 60404-3.

Note 2.The term "magnetic polarization" used in this document is detailed in IEC 60050-121.In some early standards or publications, it was also called "magnetic flux density" or