

ICS 29.100.10

CCS L 19



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

GB/Z 28865-2012

Specification for anti-EMI soft ferrite materials

抗电磁干扰软磁铁氧体材料规范

Issued on: November 5, 2012

Implemented on: February 15, 2013

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine;
Standardization Administration of the PRC**

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Foreword

GB/Z 28865-2012 was issued on 5 November 2012 by the General Administration of Quality Supervision, Inspection and Quarantine and the Standardization Administration of the People's Republic of China, and has been in force since 15 February 2013.

The document is a national standardization guiding technical document - a GB/Z - which gives guidance rather than binding requirements.

1 Scope

China's guiding technical document for the soft ferrite materials used to suppress electromagnetic interference - the material of the ferrite bead moulded round a cable and of the clamp on a monitor lead. A ferrite suppressor is unusual among electronic components in that its job is to be lossy: it does not filter the unwanted high-frequency current so much as absorb it and turn it into heat, and the property that matters is therefore not a clean inductance but the impedance the material presents over a band of frequencies. Which material to choose is a direct trade-off. A high initial permeability gives a large impedance but only up to a modest frequency; a low permeability holds its impedance far higher up the spectrum. Choose wrongly and the bead does nothing at the frequency that is actually causing the trouble. This document classifies the materials, sets out how a grade designation is built, and gives the typical magnetic properties of the main grades - initial permeability, the frequency at which the nominal impedance is measured, that impedance, the saturation flux density, the Curie temperature and the resistivity - together with the test methods. It applies to anti-EMI soft ferrite materials. Being a GB/Z, it is a guiding technical document rather than a compulsory standard.

This guiding technical document specifies the classification, the material grade

designations, the main magnetic properties and the test methods for anti-EMI soft ferrite materials.

This guiding technical document applies to anti-EMI soft ferrite materials.

2 Normative references

The following 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 all amendments, applies.

GB/T 2421.1-2008 Environmental testing for electric and electronic products - General and guidance.

GB/T 2900.60-2002 Electrotechnical terminology - Electromagnetism.

GB/T 9637-2001 Electrotechnical terminology - Magnetic materials and components.

GB/Z 28870-2012 Measuring methods for anti-EMI soft ferrite materials.

3 Definitions

The terms and definitions given in GB/T 2900.60-2002 and GB/T 9637-2001 and the following apply to this document.

3.1 normalized impedance - the product of the single-turn impedance of a bead of specified dimensions, measured under the specified test conditions, and the core constant.

3.2 saturation flux density - the flux density when the maximum value of the magnetic field strength is able to magnetise the material to saturation.

3.3 Curie temperature - the critical temperature at which a ferromagnetic or ferrimagnetic material changes from the ferromagnetic or ferrimagnetic state to the paramagnetic state.

4.1 Classification of materials

4.1.1 The materials specified in this guiding technical document belong to the soft ferrite materials.

4.1.2 Anti-EMI soft ferrite materials are divided by their chemical composition mainly into the NiZn series, the NiCuZn series and the MnZn series.

4.1.3 Each series has a number of grades, and the material of each grade can be worked into anti-EMI soft ferrite cores of various specifications according to the shape and dimensions required.

4.2 Material grade designation

4.2.1 The grade designation of an anti-EMI soft ferrite material is composed of three parts:

a) the first part is the principal name of the material, expressed in pinyin letters, K denoting an anti-electromagnetic-interference material; b) the second part is the material category, expressed in pinyin letters, N denoting the NiZn and NiCuZn series and M the MnZn series; c) the third part is the principal magnetic characteristic of the material, the initial permeability, expressed in Arabic numerals.

4.2.2 Example: in the designation KN150, K denotes anti-electromagnetic interference, N denotes the NiZn or NiCuZn series, and 150 is the nominal value of the initial permeability. An initial permeability below 1 000 is written directly as a number; one of 1 000 or above uses the letter k to stand for 1 000.

5 Requirements

The typical magnetic properties of the principal anti-EMI soft ferrite materials shall comply with Tables 1 and 2 respectively. Table 1 covers the KN class of NiZn and NiCuZn ferrite materials, listing for each grade the initial permeability with its tolerance, the frequency at which the nominal impedance is measured, the nominal impedance, the saturation flux density, the Curie temperature and the resistivity; the grades run from the highest permeability, usable only to a low frequency, down to the lowest, usable to a much higher one. A note records that manufacturers may supply materials of other supplementary grades. The footnotes fix the measurement conditions: the test temperature, the frequency associated with the initial permeability, the bead size on which the nominal impedance is measured, and the applied field strength at which the saturation flux density is determined.