

INTERNATIONAL STANDARD

**Magnetic powder cores – Guidelines on dimensions and the limits of surface irregularities –
Part 1: General specification**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MAGNETIC POWDER CORES – GUIDELINES ON DIMENSIONS AND THE LIMITS OF SURFACE IRREGULARITIES –

Part 1: General specification

FOREWORD

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International Standard IEC 63182-1 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials.

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

CDV	Report on voting
51/1324/CDV	51/1340/RVC

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.

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

A list of all parts in the IEC 63182 series, published under the general title *Magnetic powder cores – Guidelines on dimensions and the limits of surface irregularities*, 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- withdrawn,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
- amended.

INTRODUCTION

Magnetic powder core materials are distinct from ferrite materials. Whereas ferrites are homogeneous ceramic oxides, powder cores are heterogeneous magnetic alloys. Alloys which can include iron, nickel and other additives are prepared in fine powder form. The powder particles are insulated with non-conductive materials, and the resulting heterogeneous structure is formed by compaction into a core shape, such as a ring.

Magnetic powder cores are suitable for use in inductors. They are characterized by low permeability, resistance to saturation under the influence of high currents, high flux densities, high Curie temperatures, as well as soft saturation, which is controlled, and gradual reduction in inductance with increasing DC bias field, even to very high levels of bias.

The commonly used magnetic powder core materials are pure iron (Fe), iron-silicon-aluminium (FeSiAl), iron-silicon (FeSi), iron-nickel (FeNi), iron-nickel-molybdenum (FeNiMo), iron-silicon-chromium (FeSiCr), iron-based amorphous powder (FeSiB) and iron-based nanocrystalline (FeCuNbSiB) powder.

Compliance with the requirements in the sectional specifications ensures basic mechanical interchangeability of complete assemblies and wound coils. The differences in loss, DC bias, and frequency response performance among materials, and among manufacturers, are significant, even though size and permeability can be identical for parts under comparison.

Due to the method of manufacture and the physical nature of the products, magnetic powder cores can be expected to exhibit some degree of physical irregularities such as chips and ragged edges, cracks, flash, scratch, rust and discoloration. For coated cores some coating layer defects such as peeling, pinholes, bubbles, coating tips and unevenness can occur.

The permissible extent of these surface irregularities will depend on the type, position and size of the irregularity and on the function of the core. Thus, in order to establish limits of surface irregularities for a given series of magnetic powder cores, for example ring-cores, block-cores, cylinder-cores, ellipse-cores, E-cores, EQ-cores, EER-cores, U-cores and pot-cores, a particular specification for each should be prepared, setting out in detail the permissible extent of the various types of irregularities. The irregularities are considered as being detectable without the use of any magnifying equipment. An area and length reference for visual inspection is shown in Annex A.

In each particular specification relevant to a standardized core series, general rules for the calculation of limits should be defined for every kind of irregularity and for all core parts and surfaces.

For guidance on the limits of irregularities, refer to the sectional specifications of the IEC 63182 series, where limits according to core size are given in suitable tables, along with identification of irregularity types on figures and drawings.

The anticipated sectional specifications in the IEC 63182 series are shown in Annex B.