

Cores for inductors and transformers for telecommunications —

Part 2: Guide to the drafting of performance specifications

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Cooperating organizations

The Electronic Components Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- British Electrical and Allied Manufacturers' Association (BEAMA)
- Electricity Supply Industry in England and Wales
- Electronic Components Industry Federation*
- Electronic Engineering Association*
- Institution of Electronic and Radio Engineers
- Ministry of Defence*
- National Supervising Inspectorate*
- Post Office
- Society of British Aerospace Companies Limited
- Telecommunication Engineering and Manufacturing Association (TEMA)*

The organizations marked with an asterisk in the above list were directly represented on the Technical Committee entrusted with the preparation of this British Standard.

This British Standard, having been prepared under the direction of the Electronic Components Standards Committee was published under the authority of the Executive Board and comes into effect on 31 December 1980

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The following BSI references relate to the work on this standard:
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National foreword

This Part of this British Standard, which is published under the direction of the Electronic Components Standards Committee, is identical with IEC Publication 367-2 “Cores for inductors and transformers for telecommunications — Part 2: Guide for the drafting of performance specifications,” published in 1974 by the International Electrotechnical Commission (IEC) together with its supplement IEC 367-2A which was issued by IEC in 1976.

Terminology and conventions. The texts of the International Standard have been approved as suitable for publication, without deviation, as a British Standard. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

Whenever the words “recommendation” or “IEC Publication 367-2” appear, referring to this guide, they should be read as “British Standard”.

Clause 1, “Scope”, and clause 2, “Object”, are not presented in the manner that is customary in British Standards. For the purposes of this British Standard the text of these clauses, excluding the notes to clause 2, should be read as the following, which makes no change in the technical meaning.

“Scope”

This Part of this British Standard gives guidance on the drafting of specifications and article sheets for magnetic cores made of magnetic oxides or metallic powders and used in inductors and transformers for telecommunication equipment and electronic devices employing similar techniques. The subject of the specifications is the detailing of core properties which may be of importance in the most common applications of these cores.

Cross-references

International Standard	Corresponding British Standard
IEC 367-1:1971	BS 5938 <i>Cores for inductors and transformers for telecommunications</i> Part 1:1980 <i>Methods of measurement</i> (Identical)

At present there are no corresponding British Standards for the following IEC Publications referred to in the text: IEC 133:1967, IEC 205:1966 and IEC 401:1972.

The technical committee has reviewed the provisions of these IEC Publications and has decided that they are acceptable for use in conjunction with this standard.

“I.E.V.”, referred to in the text, is “International Electrotechnical Vocabulary” published by IEC. The related British Standard is BS 4727, of which Part 1: Group 07 is particularly relevant.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This recommendation applies mainly to magnetic cores made of magnetic oxides or metallic powders used in inductors and transformers for telecommunication equipment and electronic devices employing similar techniques.

2 Object of Part 2

To give guidance on the drafting of specifications and article sheets for magnetic cores, the subject of the specifications being the core properties which may be of importance in the most common applications of these cores.

NOTE 1 Data on any, or all, of the characteristics listed in the specialized clauses may be required.

NOTE 2 Since the values measured for certain characteristics depend upon the geometry and position of the measuring coil, this coil shall be specified in sufficient detail before agreement can be reached on the value of such characteristics.

NOTE 3 Where limits for core losses measured with a coil are stated in a specification, the coil losses shall be made negligible or a correction applied.

NOTE 4 Equations are given for basic SI units only. In specifications and article sheets, the following multiples or sub-multiples will normally be used:

mm⁻¹ for core factor C_1 ,
 mm⁻³ for core factor C_2 ,
 kHz for frequency,
 mH for inductance,
 nH for inductance factor,
 mT for flux density,
 mA for current,
 kA/m for magnetic field strength.

NOTE 5 The following standard symbols are used in the formulae of this recommendation:

t = time,
 Θ = temperature,
 L = self-inductance,
 μ_0 = magnetic constant, $0.4\pi \times 10^{-6}$ H/m,
 μ_r = relative permeability,^a
 μ_i = initial permeability,
 μ_e = effective permeability = $\frac{LC_1}{\mu_0 N^2}$
 μ_{rev} = reversible permeability,
 N = number of turns on the measuring coil,
 C_1 and C_2 = core factors defined in IEC Publication 205, Calculation of the Effective Parameters of Magnetic Piece Parts,
 A_e = effective cross-sectional area,
 ω = angular frequency = $2\pi \times$ frequency of measuring current.

^a In the case of qualified versions of permeability, such as initial permeability μ_i , the relative quantity is meant, unless otherwise stated.

3 General information

3.1 References

For the definitions of the terms used in this guide see:

- IEC Publication 50: International Electrotechnical Vocabulary;
- Advance Edition of I.E.V:Chapter 901: Magnetism.
 For the effective parameters (core factors and effective dimensions), see:
- IEC Publication 205: Calculation of the Effective Parameters of Magnetic Piece Parts.

3.2 General explanation on measuring and testing

3.2.1 Direct measuring methods

The direct measuring methods allow the measurement of the characteristics of the cores directly and should therefore be used when comparing different cores made of different materials by different manufacturers such as is done in the case of type tests.

For these test methods, reference should be made to Part 1.

3.2.2 Indirect measuring methods

The indirect measuring methods only allow the comparison of cores of the same construction and material, made by the same manufacturer. Their use is therefore restricted to those cases where the correlation with the direct measuring methods has been established. After agreement between manufacturer and purchaser (or his nominee), they may be used for factory tests and for acceptance tests.

3.2.3 Type of core

A type comprises cores having definite common features and manufactured by the same technology.

NOTE Common features cover in general the core shape and the properties of the material used.

3.2.4 Test

A procedure followed in order to determine whether a particular requirement of a specification is met.

3.2.5 Type test

A series of tests carried out on a number of specimens representative of the type with the object of determining whether a particular manufacturer is able to make products meeting the specification.

3.2.6 Type approval (qualification approval)

Decision by the appropriate authority that a particular manufacturer is able to produce, in reasonable quantity, a product meeting the specification.

3.2.7 Quality conformance tests

Tests carried out under the responsibility of the manufacturer to ensure that products accepted for delivery comply with the specification.

3.2.8 Number of specimens

1) General

The number of specimens to be tested in any particular case depends upon the purpose of the testing and the accuracy to be achieved for the result.

2) Type testing

In the case of type tests, the sample shall be representative of the range of values (sizes, A_L values, tolerances, etc.) of the type under consideration.

The appropriate number of specimens to be tested shall be agreed upon between customer and supplier.

NOTE Part of a full range, or individual values, may be subjected to type tests in order to gain limited type approval.

3) Failures

This guide does not specify the number of permissible failures; this is considered to be the prerogative of the authority giving type approval.

3.3 Sub-division of the characteristics

Recommendations for the characteristics to be specified for the various types of cores are listed in Clauses 4 and onwards. They depend upon the general application of the core. These lists of characteristics are divided into two parts serving the following main purposes:

- to state the minimum information on performance characteristics required in specifications for transformer and inductor cores, referred to as “minimum information in core specifications”.
- to give recommendations for further information which may be supplied by the manufacturer for the use of designers, referred to as “additional information on cores”.

In addition to these two categories, guidance on mechanical requirements may be given.

3.4 Definitions of terms

In addition to those included in IEC Publication 50(901), Advance edition of International Electrotechnical Vocabulary (I.E.V.), Chapter 901: Magnetism, the following definitions apply for the purpose of this publication.