

# INTERNATIONAL STANDARD

**IEC**  
**60205**

Third edition  
2006-04

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## Calculation of the effective parameters of magnetic piece parts



Reference number  
IEC 60205:2006(E)

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PRICE CODE

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Technical draft for comment  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**CALCULATION OF THE EFFECTIVE PARAMETERS  
OF MAGNETIC PIECE PARTS**
**FOREWORD**

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International Standard IEC 60205 has been prepared by IEC technical committee 51: Magnetic components and ferrite materials.

This third edition cancels and replaces the second edition published in 2001, corrigendum 1 (2001). This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) unit of angles through the text are described by using "radian";
- b) new words are added in 2.1 "All angles are in radians";
- c) replacement, Clause 3.9, of the equation  $\frac{l_2}{A_2} = \frac{\ln d_2 g / d_3}{D\pi(h_1 - h_2)}$  by  $\frac{l_2}{A_2} = \frac{\ln d_2 g / d_3}{D\pi(h_1 - h_2)/2}$ ;
- d) new cores "EL, ER, PQ, EFD and E planar" are added in this edition.

The text of this standard is based on the following documents:

| FDIS        | Report on voting |
|-------------|------------------|
| 51/848/FDIS | 51/857/RVD       |

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

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- withdrawn;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

A bilingual version of this publication may be issued at a later date.

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## CALCULATION OF THE EFFECTIVE PARAMETERS OF MAGNETIC PIECE PARTS

### 1 Scope

This International Standard lays down uniform rules for the calculation of the effective parameters of closed circuits of ferromagnetic material.

### 2 Basic rules

The following basic rules are applicable to this standard.

**2.1** All results shall be expressed in units based on the millimetre, shall be accurate to three significant figures, but to derive  $l_e$ ,  $A_e$ , and  $V_e$  the values of  $C_1$  and  $C_2$  shall be calculated to five significant figures. All angles are in radians.

NOTE The purpose of specifying this degree of accuracy is only to ensure that parameters calculated at different establishments are identical and it is not intended to imply that the parameters are capable of being determined to this accuracy.

**2.2**  $A_{\min}$  is the nominal value of the smallest cross-section. All the dimensions used to calculate  $A_{\min}$  shall be the mean values between the tolerance limits quoted on the appropriate piece part drawing.

**2.3** Calculations are only applicable to the component parts of a closed magnetic circuit.

**2.4** All dimensions used for the purpose of calculations shall be the mean value within the tolerance limits quoted on the appropriate piece part drawing.

**2.5** All irregularities in the outline of the core, such as small cut-outs, notches, chamfers, etc. shall be ignored unless otherwise described.

**2.6** When the calculation involves the sharp corner of a piece part, then the mean length of flux path for that corner shall be taken as the mean circular path joining the centres of area of the two adjacent uniform sections, and the cross-sectional area associated with that length shall be taken as the average area of the two adjacent uniform sections.

Calculation of effective parameters  $l_e$ ,  $A_e$  and  $V_e$ .

The effective parameters can be defined as

$$l_e = C_1^2 / C_2 \quad A_e = C_1 / C_2 \quad V_e = l_e A_e = C_1^3 / C_2^2$$

where

$l_e$  is the effective magnetic length of the core (mm);

$A_e$  is the effective cross-sectional area (mm<sup>2</sup>);

$V_e$  is the effective volume (mm<sup>3</sup>);

$C_1$  is the core constant (mm<sup>-1</sup>);

$C_2$  is the core constant (mm<sup>-3</sup>).