IEC 60205

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1

AMENDEMENT 1

Calculation of the effective parameters of magnetic piece parts

Calcul des paramètres effectifs des pièces magnétiques

IEC 60205:2006/A1:2009

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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FOREWORD

This amendment has been prepared by IEC technical committee 51: Magnetic components and ferrite materials.

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

CDV	Report on voting
51/928A/CDV	51/940/RVC

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

The French version of this amendment has not been voted upon.

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- withdrawn,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.

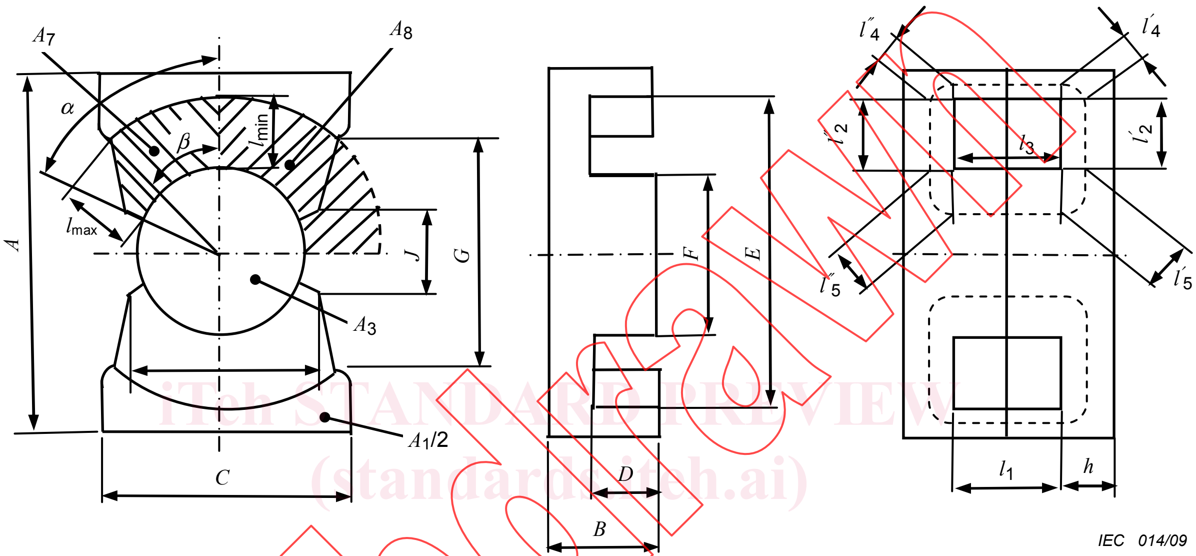
Replace the existing subclause 3.12 with the following new text.

3.12 Pair of PQ-cores

NOTE 1 This calculation ignores the effect of spring recesses.

NOTE 2 PQ+PLT (Plate)-cores use PQ core formulas.

NOTE 3 The equations below are consistent with those given in IEC 62317-13.



Area of outer leg:

$$A_1 = C(A - G) - \frac{\beta E^2}{2} + \frac{1}{2} GI$$

where

$$\beta = \arccos\left(\frac{G}{E}\right)$$

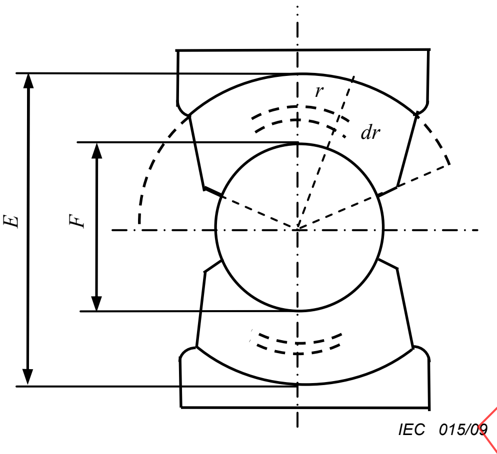
$$I = E \sin \beta$$

Mean length of flux path at outer leg:

$$l_1 = 2D$$

Core factors associated with l_2:

For l_2, A_2 the elemental radius dr shown in the figure is elemental length of the flux path in the integral below. The radius vector extends from F/2 to E/2 for the entire circle. The effective length l_{2i} for the section is multiplied by f. The area is the physical area multiplied by K.



$$\frac{l_{2i}}{A_2} = \int_{\frac{F}{2}}^{\frac{E}{2}} \frac{f}{K2\pi r(B-D)} dr = \frac{f}{2\pi K(B-D)} \ln\left(\frac{E}{F}\right)$$

$$\frac{l_{2i}}{A_2^2} = \int_{\frac{F}{2}}^{\frac{E}{2}} \frac{f}{[2\pi K(B-D)r]^2} dr = f \frac{\left(\frac{1}{F}-\frac{1}{E}\right)}{2[\pi K(B-D)]^2}$$

From this A_2 is computed. The total magnetic length of this section is $2l_{2i}$ for the top and bottom halves together.

$$A_2 = \pi KEF \frac{B-D}{E-F} \ln\left(\frac{E}{F}\right)$$

$$l_2 = 2l_{2i} = f \frac{EF}{E-F}\left(\ln\left(\frac{E}{F}\right)\right)^2$$

where

$$K = \frac{A_7}{A_8} = \frac{A_7}{\frac{\pi}{16}\left(E^2 - F^2\right)}$$

$$A_7 = \frac{1}{8}\left(\beta \cdot E^2 - \alpha \cdot F^2 + G \cdot L - J \cdot I\right)$$

$$\alpha = \arctan\left(\frac{L}{J}\right)$$

$$f = \frac{l_{\min} + l_{\max}}{2 l_{\min}}$$

$$l_{\max} = \frac{\sqrt{E^2 + F^2 - 2EF\cos(\alpha - \beta)}}{2}$$

Define the other two physical areas in the flux path at back wall.

$$A_9 = 2\alpha \cdot F(B - D)$$

$$A_{10} = 2\beta \cdot E(B - D)$$

The mathematical area A_2 is given as $A_{10} > A_2 > A_9$.

Area of centre limb:

$$A_3 = \frac{1}{4}\pi F^2$$

Mean length of flux path at centre limb:

$$l_3 = 2D$$

Area of outside corner:

$$A_4 = \frac{1}{2}(A_1 + A_{10}) = \frac{1}{2}[A_1 + 2E(B - D)\beta]$$

Mean length of flux path at outside corner:

$$l_4 = l_4^{'} + l_4^{''} = \frac{\pi}{4}\left((B - D) + \frac{1}{2}A - \frac{1}{2}E\right)$$

Area of inside corner:

$$A_5 = \frac{1}{2}(A_3 + A_9) = \frac{\pi}{2}\left(\frac{F}{2}\right)^2 + F(B - D)\alpha$$

Mean length of flux path at inside corner:

$$l_5 = l_5^{'} + l_5^{''} = \frac{\pi}{4}\left((B - D) + \left(1 - \frac{1}{\sqrt{2}}\right)F\right)$$

$$C_1 = \sum_{i=1}^{5} \frac{l_i}{A_i} \qquad C_2 = \sum_{i=1}^{5} \frac{l_i}{A_i^2}$$

The minimum physical cross-section area A_{min} is given as:

$$A_{min} = \min (A_1, A_3, A_4, A_5, A_9)$$

$$l_e = \frac{C_1^2}{C_2} \qquad A_e = \frac{C_1}{C_2} \qquad V_e = \frac{C_1^3}{C_2^2}$$

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AVANT-PROPOS

Le présent amendement a été établi par le comité d'études 51 de la CEI: Composants magnétiques et ferrites.

Le texte anglais de cet amendement est issu des documents 51/928A/CDV et 51/940/RVC.

Le rapport de vote 51/940/RVC donne toute information sur le vote ayant abouti à l'approbation de cet amendement.

La version française de cet amendement n'a pas été soumise au vote.

Cette publication a été rédigée selon les Directives ISO/CEI, Partie 2.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de maintenance indiquée sur le site web de la CEI sous "http://webstore.iec.ch" dans les données relatives à la publication recherchée. A cette date, la publication sera

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