BS EN 62317-11:2016

BSI Standards Publication

Ferrite cores — Dimensions

Part 11: EC-cores for use in power supply applications

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 62317-11:2016. It is identical to IEC 62317-11:2015.

The UK participation in its preparation was entrusted to Technical Committee EPL/51, Transformers, inductors, magnetic components and ferrite materials.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2016

ISBN 978 0 580 86202 1
ICS 29.100.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2016.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62317-11

February 2016

ICS 29.100.10

English Version

Ferrite cores - Dimensions - Part 11: EC-cores for use in power supply applications (IEC 62317-11:2015)

Noyaux ferrites - Dimensions - Partie 11: Noyaux EC utilisés dans des applications d'alimentation électrique (IEC 62317-11:2015)

Ferritkerne - Maße - Teil 11: EC-Kerne für den Einsatz in Netzteilen (IEC 62317-11:2015)

This European Standard was approved by CENELEC on 2015-12-23. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 51/1077/CDV, future edition 1 of IEC 62317-11, prepared by IEC/TC 51 "Magnetic components and ferrite materials" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62317-11:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-09-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-12-23

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62317-11:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60205:2006	NOTE	Harmonized as EN 60205:2006.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FERRITE CORES – DIMENSIONS –

Part 11: EC-cores for use in power supply applications

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62317-11 has been prepared by IEC technical committee 51: Magnetic components and ferrite materials.

This first edition cancels and replaces the first edition of IEC 60647 published in 1979. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the first edition of IEC 60647:

a) addition of EC90 and EC120 cores in Table 1,
b) addition of effective parameter and $A_{\min}$ values and main dimensions of coil formers for EC90 and EC120 cores.

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

CDV	Report on voting
51/1077/CDV	51/1083/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.

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

A list of all parts in the IEC 62317 series, published under the general title *Ferrite cores – Dimensions*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

INTRODUCTION

IEC 62317 consists of the following parts, under the general title *Ferrite cores – Dimensions:*

Part 1: General specification
Part 2: Pot-cores for use in telecommunications, power supply, and filter applications
Part 3: Dimensions of half pot-cores made of ferrite for inductive proximity switches[1]
Part 4: RM-cores and associated parts
Part 5: EP-cores and associated parts for use in inductors and transformers
Part 6: ETD-cores for use in power supplies
Part 7: EER-cores
Part 8: E-cores
Part 9: Planar cores
Part 10: PM-cores made of magnetic oxides and associated parts – Dimensions[2]
Part 11: EC-cores for use in power supply applications
Part 12: Dimensions of uncoated ring cores of magnetic oxides[3]

———————

[1] Under consideration, currently available as IEC 62323.

[2] Under consideration, currently available as IEC 61247.

[3] Under consideration, currently available as IEC 61604.

FERRITE CORES – DIMENSIONS –

Part 11: EC-cores for use in power supply applications

1 Scope

This part of IEC 62317 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of EC-cores, the essential dimensions of coil formers to be used with them, and the effective parameter values to be used in calculations involving them.

The selection of core sizes for this standard is based on the philosophy of including those sizes which are industrial standards, either by inclusion in national standards, or by broad-based use in industry. See 62317-1 for more detail concerning the philosophy of selecting core sizes to be included.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Void.

3 Primary standards

3.1 General

Compliance with the following requirements ensures mechanical interchangeability of complete assemblies and wound coil formers.

3.2 Dimensions of EC-cores

3.2.1 Principal dimensions

The principal dimensions of EC-cores shall be as given in Figure 1 and Table 1.

3.2.2 Effective parameter and A_{min} values

The effective parameter values of a pair of cores having the dimensions given in 3.2.1 are as shown in Table 2.

A_{min} is specified in IEC 60205:2006, 2.2.

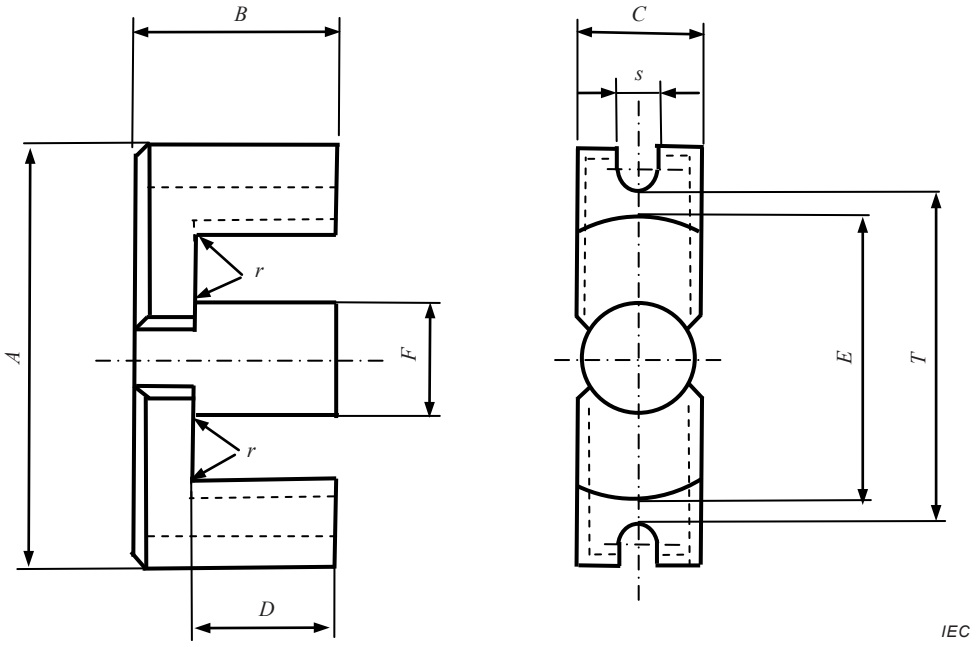

Figure 1 – Principal dimensions of EC-cores

Table 1 – Principal dimensions of EC-cores

Size	*A* mm		*B* mm		*C* mm		*D* mm		*E* mm		*F* mm		*r* mm	*s* mm		*T* mm	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Min.	Max.	Min.	Max.
EC 35	33,7	35,3	17,15	17,45	9,2	9,8	11,9	12,6	22,2	23,3	9,2	9,8	0,5	2,5	3,0	27,7	29,3
EC 41	39,6	41,6	19,35	19,65	11,3	11,9	13,5	14,3	26,3	27,8	11,3	11,9	0,7	3,0	3,3	32,6	34,6
EC 52	50,9	53,5	24,05	24,35	13,05	13,75	15,5	16,3	32,1	33,9	13,05	13,75	0,8	3,5	4,0	42,7	45,3
EC 70	68,3	71,7	34,35	34,65	16,0	16,8	22,3	23,2	43,3	45,7	16,0	16,8	1,0	4,5	5,0	57,9	61,3
EC 90	88,2	91,8	44,35	45,65	29,0	31,0	35,0	36,0	68,5	71,5	29,0	31,0	1,0	5,2	5,8	77,2	80,8
EC 120	118,0	122,0	49,85	51,15	29,0	31,0	35,0	36,0	93,3	96,7	29,0	31,0	1,5	5,2	5,8	111,0	107,0

Table 2 – Effective parameter and A_{min} values

Size	C_1 mm^{-1}	C_2 mm^{-3}	l_e mm	A_e mm^2	V_e mm^3	A_{min} mm^2
EC 35	0,901 41	$10{,}618 \times 10^{-3}$	76,5	84,9	6 500	70,9
EC 41	0,718 97	$5{,}864\ 0 \times 10^{-3}$	88,2	123	10 800	106
EC 52	0,571 92	$3{,}167\ 6 \times 10^{-3}$	103	181	18 600	141
EC 70	0,508 59	$1{,}818\ 6 \times 10^{-3}$	142	280	39 800	211
EC 90	0,342 50	$0{,}547\ 70 \times 10^{-3}$	215	629	135 000	570
EC 120	0,324 96	$0{,}421\ 00 \times 10^{-3}$	251	772	194 000	707
NOTE The manufacturers can indicate in their catalogues more precise values than those given in Table 2.						

3.3 Main dimensions for coil formers

The main dimensions of coil formers suitable for use with a pair of EC-cores shall be as given in Figure 2 and Table 3.

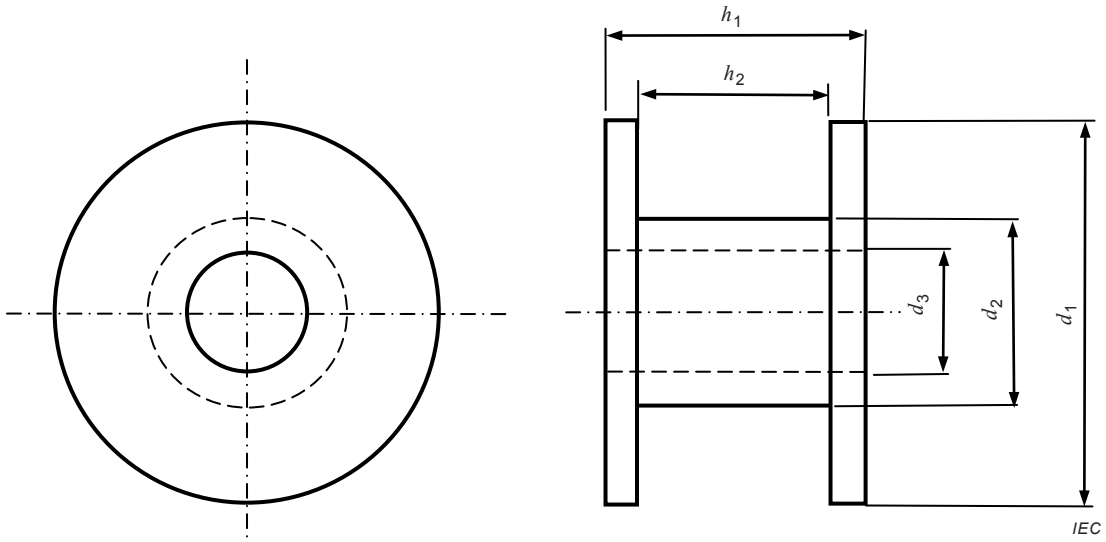

Figure 2 – Main dimensions of coil formers for EC-cores

Table 3 – Main dimensions of coil formers for EC-cores

Size	d_1 mm	d_2 mm	d_3 mm	h_1 mm	h_2 mm
	Max.	**Max.**	**Min.**	**Max.**	**Min.**
EC 35	21,8	12,3	9,9	23,6	21,4
EC 41	25,8	14,4	12,0	26,8	24,4
EC 52	31,6	16,3	13,85	30,7	28,2
EC 70	42,7	19,6	17,0	44,3	41,3
EC 90	67,7	35,6	31,4	69,6	64,8
EC 120	92,4	35,6	31,4	69,6	64,8

Annex A
(normative)

Example of standard coil formers

Examples of standard coil formers for EC35, EC41, EC52 and EC70 cores are shown in Figure A.1 and for EC90 core are shown in Figure A.2 and in Table A.1.

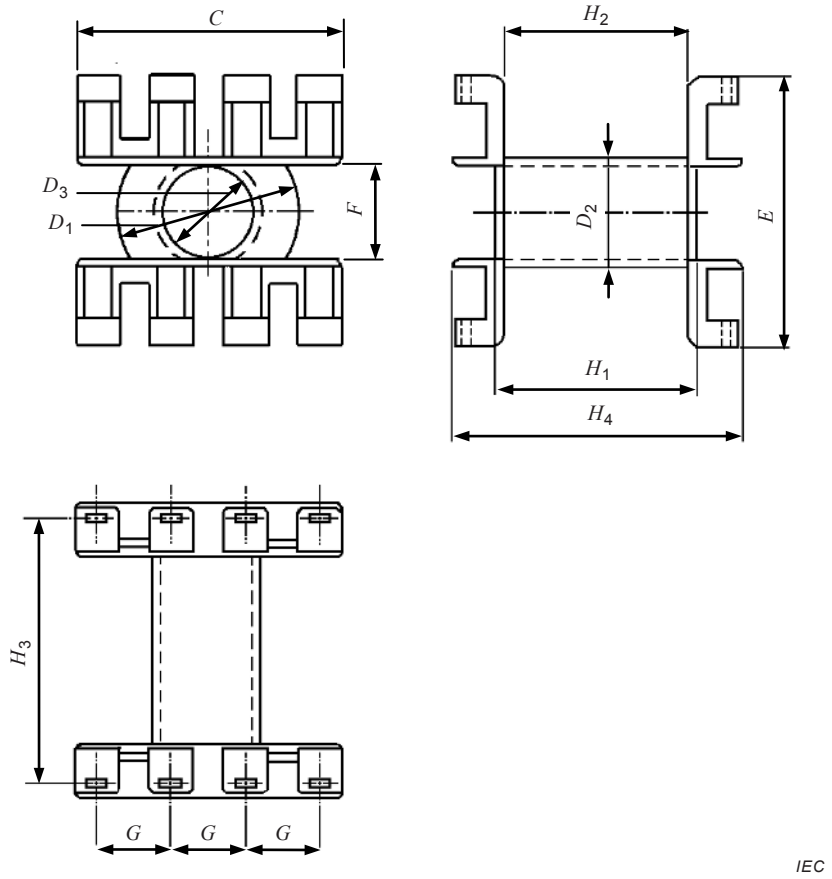

Figure A.1 – Main dimensions of coil formers for EC35, EC41, EC52, EC70 cores

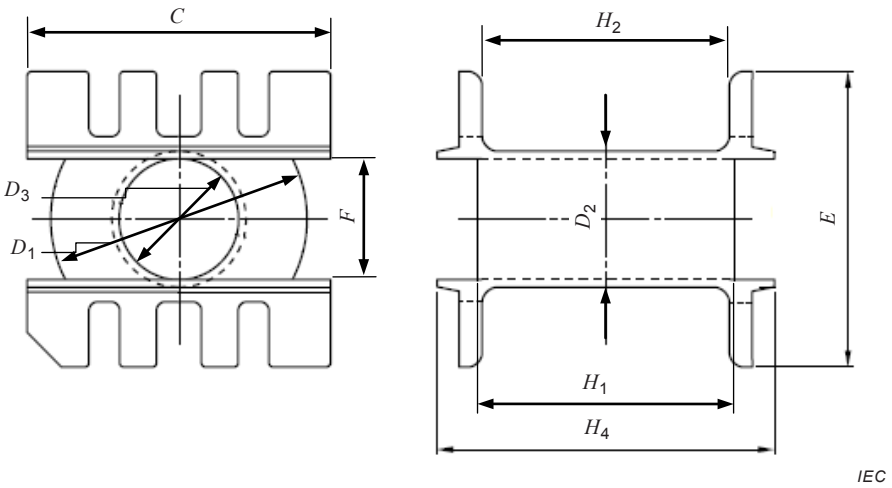

Figure A.2 – Main dimensions of coil formers for EC90 core

Table A.1 – Main dimensions of coil formers (examples of Figure A.1 and A.2) for EC-cores

Reference	EC35			EC41			EC52			EC70			EC90			Unit
	Min.	Nom	Max.	Min.	Nom	Max.	Min.	Nom	Max.	Min.	Nom	Max.	Min.	Nom	Max.	
C	28,4		28,8	28,4		28,8	43,6		44,0	56,3		56,7	79,5		80,5	mm
D_1	21,3		21,8	25,5		25,8	31,3		31,6	42,4		42,7	66,3		67,7	mm
D_2	12,1		12,3	14,2		14,4	16,1		16,3	19,4		19,6	34,8		35,6	mm
D_3	9,9		10,1	12,0		12,2	13,85		14,05	17,0		17,3	31,4		31.8	mm
E	32,4		32,8	37,0		37,4	42,7		43,1	56,0		56,5	76,0		77,0	mm
F	9,9		10,1	12,0		12,2	13,85		14,05	17,0		17,3	31,2		32,1	mm
G		7,62			7,62			7,62			10,16					mm
H_1	23,4		23,6	26,6		26,8	30,4		30,7	44,0		44,3	68,6		69,6	mm
H_2	21,4		21,6	24,4		24,6	28,2		28,4	41,3		41,6	64.8		65,8	mm
H_3	30,43		30,53	32,97		33,07	38,05		38,15	50,75		50,85	-		-	mm
H_4	33,8		34,2	38,3		38,5	44,2		44,5	57,6		58,0	89,1		90,5	mm

Annex B
(normative)

Calculation of the effective parameters of EC-cores

A pair of cores is shown in Figure B.1.

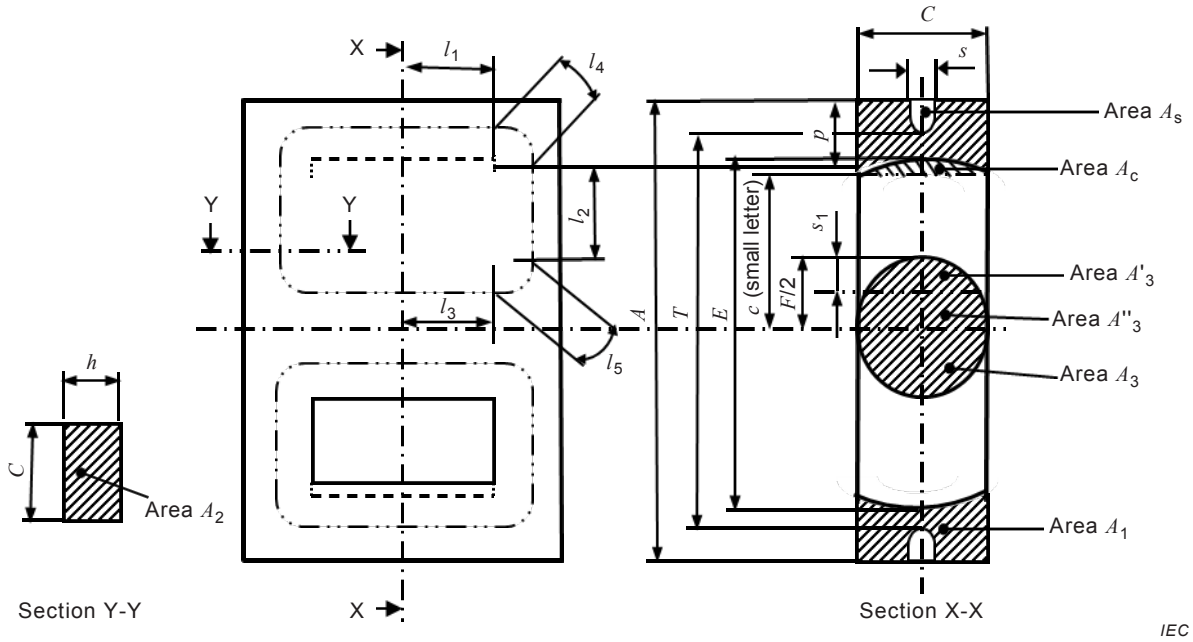

Figure B.1 – Pair of EC cores

A_1 is equal to the rectangle $C\left(\frac{1}{2}A - c\right)$ minus the segment A_c and the segment A_s.

$$A_C = \frac{1}{4}E^2 \arcsin\left(\frac{C}{E}\right) - \frac{1}{4}C\sqrt{E^2 - C^2}$$

$$A_s = \frac{s(A - T - s)}{2} + \frac{\pi s^2}{8}$$

$$A_1 = \frac{1}{2}AC - \frac{1}{4}C\sqrt{E^2 - C^2} - \frac{1}{4}E^2 \arcsin\left(\frac{C}{E}\right) - \frac{s(A - T - s)}{2} - \frac{\pi s^2}{8}$$

The mean length of the flux path at the back walls is expressed as:

$$l_2 = \frac{1}{4}\left(E + \sqrt{E^2 - C^2}\right) - \frac{F}{2}$$

NOTE l_2 is taken from the mean value of $\frac{1}{2}(E - F)$ and $(c - F/2)$.

The area of half the centre limb is expressed as:

$$A_3 = A'_3 + A''_3$$

The condition to obtain $A'_3 = A''_3$ is

$$S_1 = 0{,}2980F$$

The mean length of flux path at corners is expressed as:

$$l_4 = \frac{\pi}{8}(p + h)$$

where $p = \frac{A}{2} - l_2 - \frac{F}{2}$

$$l_5 = \frac{\pi}{8}(2S_1 + h)$$

The mean areas associated with l_4 and l_5 are expressed as:

$$A_4 = \frac{A_1 + A_2}{2}$$

$$A_5 = \frac{A_2 + A_3}{2}$$

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

Bibliography

IEC 60205:2006, *Calculation of the effective parameters of magnetic piece parts*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.