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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Ferrite cores – Guidelines on dimensions and the limits of surface irregularities – Part 8: E-cores

Noyaux ferrites – Lignes directrices relatives aux dimensions et aux limites des irrégularités de surface – Partie 8: Noyaux E

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FERRITE CORES – GUIDELINES ON DIMENSIONS AND THE LIMITS OF SURFACE IRREGULARITIES –

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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.

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International Standard IEC 63093-8 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials.

This first edition cancels and replaces the first edition of IEC 62317-8 published in 2006 and the second edition of IEC 60424-3 published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62317-8:2006 and IEC 60424-3:2015:

a) This document integrates IEC 62317-8:2006 and IEC 60424-3:2015;

b) Table 4 – Allowable areas of chips for E-cores, of IEC 60424-3:2015, has been moved to Annex C (informative) of this document.

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

CDV	Report on voting
51/1213/CDV	51/1235/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 63093 series, published under the general title *Ferrite 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.

FERRITE CORES – GUIDELINES ON DIMENSIONS AND THE LIMITS OF SURFACE IRREGULARITIES –

Part 8: E-cores

1 Scope

This part of IEC 63093 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of E-cores made of ferrite and the essential dimensions of coil formers to be used with them, as well the effective parameter values to be used in calculations involving them. It also gives guidelines on allowable limits of surface irregularities applicable to E-cores.

The specifications contained in this document are useful in negotiations between ferrite core manufacturers and customers about surface irregularities.

The use of derived standards, which give more detailed specifications of component parts while still permitting compliance with this standard, is discussed in Annex A.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 60401-1, *Terms and nomenclature for cores made of magnetically soft ferrites – Part 1: Terms used for physical irregularities*

IEC 60424-1, *Ferrite cores – Guidelines on the limits of surface irregularities – Part 1: General specification*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 60401-1 and IEC 60424-1 apply.

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4 Primary dimensions

4.1 General

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

4.2 Dimensions of E-cores

4.2.1 Main dimensions

The main dimensions of E-cores with rectangular cross-section shall be those given in Table 1.

The dimensions of the cores can be checked by means of gauges, an example of which is given in Annex B. In order to facilitate production it can be necessary to use gauges with dimensions differing from those given in Annex B, although no relaxation of the requirements for the dimensions of the cores given in Table 1 is thereby permitted. The dimensions specified in Table 1 are illustrated in Figure 1.

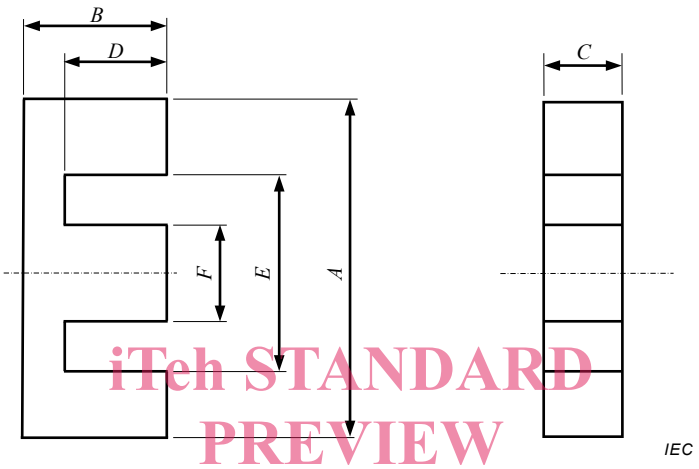

Figure 1 – Dimensions of E-cores with rectangular cross-section

Table 1 – Dimensions of E-cores with rectangular cross-section

Size	*A* mm		*B* mm		*C* mm		*D* mm		*E* mm		*F* mm		IEC 61246[a] references	Industrial references
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
E5,3/2	5,15	5,35	2,57	2,73	1,90	2,00	1,92	2,08	3,80	4,00	1,30	1,40	E5,3/2	FEE5,25; EE5
E6,3/2	6,05	6,30	2,80	2,90	1,90	2,00	1,85	2,05	3,60	3,80	1,30	1,40	E6,3/2	FEE6,18
E8/2	7,85	8,15	3,95	4,05	2,30	2,40	2,85	2,95	5,60	5,80	2,30	2,40	E8/2	FEE8
E8,3/4	8,10	8,60	3,90	4,10	3,40	3,80	2,90	3,10	6,10	6,50	1,60	2,00		FEE8,3; EE8
E8,8/2	8,60	9,40	3,85	4,15	1,78	2,02	2,03	2,40	5,07	5,33	1,78	2,02	E8,8/2	FEE9
E10/3	9,80	10,2	4,88	5,00	2,88	3,00	3,50	3,62	7,00	7,30	2,88	3,00	E10/3	FEE10
E10,2/5	10,0	10,5	5,35	5,65	4,50	4,90	4,05	4,35	7,60	8,00	2,20	2,60		FEE10,2; EE10/11
E13/4	12,2	13,1	6,30	6,50	3,40	3,70	4,50	4,80	8,90	9,50	3,40	3,70	E13/4	FEE12,7A; EF12,6
E13/6	12,8	13,2	5,85	6,15	6,00	6,30	4,50	4,70	10,0	10,4	2,60	2,90		EE13
E16/4,8	15,7	16,3	7,00	7,30	4,60	5,00	5,00	5,40	11,7	12,3	3,80	4,20		FEE16A; EE16
E16/5	15,5	16,7	7,90	8,20	4,30	4,70	5,70	6,10	11,3	11,9	4,40	4,70	E16/5	FEE16,1; EF16
E19/5	18,6	19,4	7,80	8,20	4,80	5,20	5,40	5,80	14,2	14,8	4,30	4,70		FEE19A; EE19
E19,3/4,8	18,97	19,61	7,92	8,28	4,63	4,88	5,59	5,84	14,05	14,7	4,67	4,83		EE-187; EE19/16
E20/6	19,4	20,8	9,80	10,2	5,40	5,90	7,00	7,40	14,1	14,7	5,50	5,90	E20/6	FEE20,1; EF20
E25/7	24,3	25,8	12,3	12,8	6,90	7,50	8,70	9,20	17,5	18,3	7,00	7,50	E25/7	FEE25,1; EF25
E25,4/6	24,9	25,9	9,30	9,70	6,05	6,65	6,20	6,60	18,6	19,4	6,05	6,65		FEE25,4A
E25,4/6,3	24,9	25,9	9,27	9,65	6,10	6,48	6,22	6,60	18,55	19,81	6,10	6,60		EE24/25; EE25/19
E30/11	29,5	30,6	12,9	13,5	10,4	11,0	7,90	8,50	19,5	20,5	10,4	11,0		FEE30A; EE30
E32/9	31,3	32,9	15,8	16,4	8,80	9,50	11,2	11,8	22,7	23,7	8,90	9,50	E32/9	FEE32,1; EF32
E33/13	32,5	33,9	13,5	14,1	12,4	13,0	9,00	9,60	23,1	24,1	9,40	10,0		FEE33A; EE33
E34,6/9	33,9	35,3	13,9	14,64	8,90	9,72	9,51	10,05	25,0	26,2	9,10	9,70		EE375; EE35/28B
E35/10	34,5	35,7	15,2	15,8	9,70	10,3	9,20	9,80	24,5	25,5	9,70	10,3		FEE35A; EE35
E40/11	39,5	40,7	16,7	17,3	10,4	11,0	10,0	10,6	27,5	28,5	9,70	11,0		FEE40A; EE40
E41/13	40,27	41,87	16,38	17,18	12,19	12,95	10,08	10,68	28,55	29,59	12,19	13,1		EE21; EE41/33C

Size	*A* mm		*B* mm		*C* mm		*D* mm		*E* mm		*F* mm		IEC 61246[a] references	Industrial references
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
E42/15	41,3	43,0	20,8	21,2	14,7	15,2	14,8	15,5	29,5	30,7	11,7	12,2	E42/15	FEE42A
E42/20	41,3	43,0	20,8	21,2	19,2	20,0	14,8	15,5	29,5	30,7	11,7	12,2	E42/20	FEE42B
E47/16	46,1	47,88	19,4	19,83	15,35	15,87	12,07	12,5	31,72	32,56	15,35	15,87		EE625; EE47/39
E50/15	49,3	51,0	21,0	21,6	14,2	15,0	12,5	13,1	34,3	35,7	14,2	15,0		EE50A; EE50
E55/21	54,1	56,2	27,2	27,8	20,4	21,0	18,5	19,3	37,5	38,7	16,7	17,2	E55/21	FEE55,2A
E55/25	54,1	56,2	27,2	27,8	24,2	25,0	18,5	19,3	37,5	38,7	16,7	17,2	E55/25	FEE55,2B
E60/16	59,2	61,1	22,0	22,6	15,2	16,0	13,7	14,0	43,7	45,3	15,2	16,0		FEE60A; EE60
E65/27	63,8	66,5	32,2	32,8	26,6	27,4	22,2	23,0	44,2	45,7	19,3	20,0	E65/27	FEE65,2

[a] Withdrawn publication.

4.2.2 Effective parameter and A_{min} values

The effective parameter values of a pair of cores whose dimensions comply with 4.2.1 shall be as given in Table 2. For the definitions of these parameters and their calculations, reference shall be made to IEC 60205.

Table 2 – Effective parameter and A_{min} values

Size[a]	C_1 mm^{-1}	C_2 mm^{-3}	l_e mm	A_e mm^2	V_e mm^3	A_{min}[b] mm^2	IEC 61246[c] references	Industrial references
E5,3/2	4,850 4	1,863 0	12,6	2,60	32,9	2,54 B		
E6,3/2	3,764 6	1,148 7	12,3	3,28	40,4	2,63 C	E6,3/2	FEE6,18
E8/2	3,439 7	0,639 76	18,5	5,38	99,4	5,17 B	E8/2	FEE8
E8,3/4	2,800 3	0,401 68	19,5	6,97	136	6,48 C		FEE8,3; EE8
E8,8/2	3,154 0	0,635 22	15,7	4,97	77,8	3,61 C	E8,8/2	FEE9
E10/3	2,726 6	0,324 93	22,9	8,40	192	8,11 B	E10/3	FEE10
E10,2/5	2,250 3	0,193 83	26,1	11,6	303	11,3 C		FEE10,2; EE10/11
E13/4	2,394 6	0,192 77	29,7	12,4	369	12,2 L	E13/4	FEE12,7A; EF12,6
E13/6	1,766 3	0,103 21	30,2	17,1	517	16,9 C		EE13
E16/4,8	1,837 9	$9,651\ 2 \times 10^{-2}$	35,0	19,0	667	18,7 B		FEE16A; EE16
E16/5	1,872 4	$9,333\ 3 \times 10^{-2}$	37,6	20,1	754	19,4 B	E16/5	FEE16,1; EF16
E19/5	1,726 4	$7,512\ 0 \times 10^{-2}$	39,7	23,0	912	22,5 C		FEE19A; EE19
E19,3/4,8	1,751 0	$7,661\ 8 \times 10^{-2}$	40,0	22,9	914	22,6 C		EE-187; EE19/16
E20/6	1,447 3	$4,516\ 8 \times 10^{-2}$	46,4	32,0	1 490	31,6 B	E20/6	FEE20,1; EF20
E25/7	1,114 2	$2,149\ 5 \times 10^{-2}$	57,8	51,8	2 990	51,5 L	E25/7	FEE25,1; EF25
E25,4/6	1,198 6	$2,984\ 8 \times 10^{-2}$	48,1	40,2	1 930	39,4 B		FEE25,4A
E25,4/6,3	1,232 8	$3,153\ 8 \times 10^{-2}$	74,2	39,1	1 880	38,4 B		EE24/25; EE25/19
E30/11	0,529 47	$4,828\ 8 \times 10^{-3}$	58,1	110	6 370	107 B		FEE30A; EE30
E32/9	0,893 64	$10,746 \times 10^{-3}$	74,3	83,2	6 180	81,4 L	E32/9	FEE32,1; EF32
E33/13	0,548 84	$4,585\ 3 \times 10^{-3}$	65,7	120	7 860	114 B		FEE33A; EE33
E34,6/9	0,819 44	$9,651\ 6 \times 10^{-3}$	69,5	84,9	5 910	83,6 B		EE375; EE35/28B
E35/10	0,660 20	$6,229\ 0 \times 10^{-3}$	70,0	106	7 420	100 C		FEE35A; EE35
E40/11	0,606 50	$4,749\ 4 \times 10^{-3}$	77,5	128	9 890	114 C		FEE40A; EE40
E41/13	0,495 37	$3,161\ 1 \times 10^{-3}$	77,6	157	12 200	151 L		EE21; EE41/33C

Size[a]	C_1 mm^{-1}	C_2 mm^{-3}	l_e mm	A_e mm^2	V_e mm^3	A_{min}[b] mm^2	IEC 61246[c] references	Industrial references
E42/15	0,546 63	$3{,}069\,3 \times 10^{-3}$	97,4	178	17 300	175 B	E42/15	FEE42A
E42/20	0,416 95	$1{,}785\,7 \times 10^{-3}$	97,4	233	22 700	229 B	E42/20	FEE42B
E47/16	0,379 69	$1{,}618\,1 \times 10^{-3}$	89,1	235	20 900	229 B		EE625; EE47/39
E50/15	0,425 62	$1{,}880\,2 \times 10^{-3}$	96,3	226	21 800	213 C		EE50A; EE50
E55/21	0,350 12	$9{,}917\,4 \times 10^{-4}$	124	353	43 600	350 C	E55/21	FEE55,2A
E55/25	0,294 62	$7{,}022\,1 \times 10^{-4}$	124	420	51 900	417 C	E55/25	FEE55,2B
E60/16	0,441 67	$17{,}708 \times 10^{-4}$	110	249	27 300	243 C		FEE60A; EE60
E65/27	0,273 57	$5{,}095\,4 \times 10^{-4}$	147	537	78 900	530 C	E65/27	FEE65,2

NOTE 1 Manufacturers can indicate more precise values in their catalogues than those given in Table 2.

NOTE 2 The above values have been calculated using the method given in IEC 60205.

[a] The core size designation contains a combination of two numbers; the first one indicates the length A of the core and the second one its thickness C (see Table 1).

[b] IEC 60205 shall be referred to for definition of A_{min}. The letters after the A_{min} values give the location of A_{min}: C is centre leg, L is outer leg, B is back wall.

[c] Withdrawn publication.

4.3 Dimensional limits for coil formers

The dimensional limits for coil formers suitable for use with a pair of E-cores of size greater than E8/2 shall be as given in Table 3. See Figure 2 for main dimensions of coil formers.

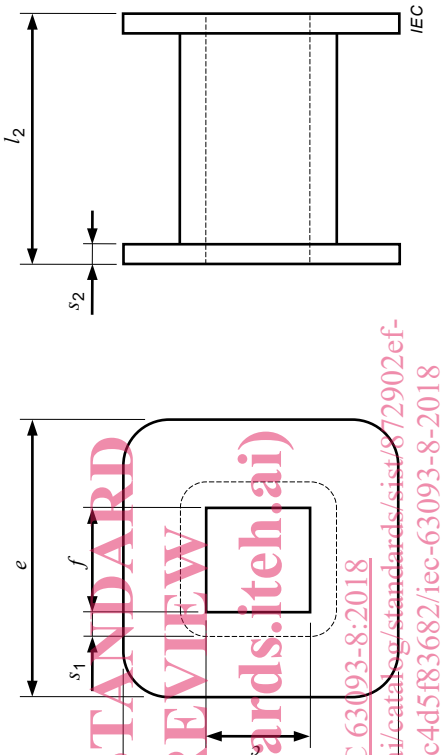

Figure 2 – Main dimensions of coil formers

Table 3 – Dimensional limits for coil formers

Size	c mm	e mm	f mm	k mm	l_2 mm	s_1 mm	s_2 mm	IEC 61246[a] references	Industrial references
	Min.	Max.	Min.	Min.	Max.	Min.	Min.		
E8/2	2,55	5,40	2,55	5,40	5,50	0,35	0,4	E8/2	FEE8
E8,3/4	3,95	5,90	2,15	5,90	5,60	0,35	0,4		FEE8,3; EE8
E8,8/2	2,17	4,87	2,17	4,87	3,86	0,35	0,4	E8,8/2	FEE9
E10/3	3,15	6,80	3,15	6,80	6,80	0,4	0,4	E10/3	FEE10
E10,2/5	5,05	7,40	2,75	7,40	7,90	0,4	0,5		FEE10,2; EE10/11
E13/4	3,90	8,70	3,90	8,70	8,80	0,5	0,5	E13/4	FEE12,7A; EF12,6
E13/6	6,45	9,80	3,05	9,80	8,80	0,4	0,5		EE13
E16/4,8	5,15	11,5	4,35	11,5	9,80	0,5	0,5		FEE16A; EE16
E16/5	4,90	11,1	4,90	11,1	11,2	0,5	0,5	E16/5	FEE16,1; EF16
E19/5	5,35	14,0	4,85	14,0	10,6	0,8	0,8		FEE19A; EE19
E19,3/4,8	5,98	13,85	5,98	13,85	11,0	0,8	0,8		EE-187; EE19/16
E20/6	6,10	13,9	6,10	13,9	13,8	0,5	0,6	E20/6	FEE20,1; EF20
E25/7	7,70	17,3	7,70	17,3	17,2	0,6	0,7	E25/7	FEE25,1; EF25
E25,4/6	6,80	18,4	6,80	18,4	12,2	0,8	0,8		FEE25,4A
E25,4/6,3	6,63	18,35	6,75	18,35	12,2	0,8	0,8		EE24/25; EE25/19
E30/11	11,2	19,3	11,2	19,3	15,6	0,8	0,8		FEE30A; EE30
E32/9	9,80	22,4	9,80	22,4	22,1	0,7	0,8	E32/9	FEE32,1; EF32
E33/13	13,2	22,9	10,2	22,9	17,7	0,8	0,8		FEE33A; EE33
E34,6/9	9,95	24,8	9,90	24,8	18,7	0,8	0,8		EE375; EE35/28B
E35/10	10,5	24,3	10,5	24,3	18,1	0,8	0,8		FEE35A; EE35
E40/11	11,3	27,3	11,3	27,3	19,7	0,8	0,8		FEE40A; EE40
E41/13	13,3	28,3	13,4	28,3	19,9	0,8	0,8		EE21; EE41/33C
E42/15	15,7	29,2	12,6	29,2	29,3	0,9	1,0	E42/15	FEE42A
E42/20	20,5	29,2	12,6	29,2	29,3	0,9	1,0	E42/20	FEE42B