

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Magnetic powder cores – Guidelines on dimensions and the limits of surface irregularities –  
Part 3: E-cores**

**Noyaux en poudre magnétique – Lignes directrices concernant les dimensions  
et les limites des irrégularités de surface –  
Partie 3: Noyaux E**

[IEC 63182-3:2021](#)

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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## MAGNETIC POWDER CORES – GUIDELINES ON DIMENSIONS AND THE LIMITS OF SURFACE IRREGULARITIES –

### Part 3: E-cores

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

Draft	Report on voting
51/1397/FDIS	51/1402/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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# MAGNETIC POWDER CORES – GUIDELINES ON DIMENSIONS AND THE LIMITS OF SURFACE IRREGULARITIES –

## Part 3: E-cores

### 1 Scope

This part of IEC 63182 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of E-cores made of metallic magnetic powder, the essential dimensions of coil formers to be used with them as well as the effective parameter values to be used in calculations involving them, and gives guidelines on allowable limits of surface irregularities applicable to E-cores.

This document is a specification useful in the negotiations between magnetic powder core suppliers and users about surface irregularities.

The use of "derived" standards which give more detailed specifications of component parts while still permitting compliance with this document 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 63182-1, *Magnetic powder cores – Guidelines on dimensions and the limits of surface irregularities – Part 1: General specification*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63182-1 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 specified in Table 1 are illustrated in Figure 1.

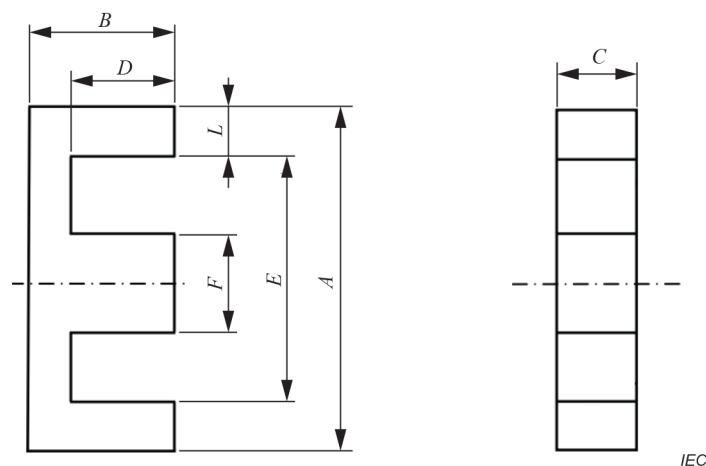


Figure 1 – Main dimensions of E-cores

Table 1 – Main dimensions of E-cores

Size <sup>a</sup>	A mm		B mm		C mm		D mm	E mm	F mm		L mm
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Min.	Max.	Nom.
E13/6/4	12,5	12,9	6,30	6,50	3,41	3,71	4,42	8,89	3,43	3,69	1,8
E19/8/5	19,0	19,6	7,92	8,28	4,63	4,93	5,5	13,9	4,65	4,91	2,4
E25/10/6	25,0	25,8	9,32	9,72	6,17	6,53	6,2	18,8	6,15	6,55	3,2
E30/15/7	29,6	30,5	14,77	15,23	6,88	7,24	9,7	19,5	6,76	7,16	5,1
E35/14/9	34,0	35,0	13,92	14,38	9,14	9,56	9,6	25,3	9,10	9,50	4,4
E41/17/13	40,3	41,5	16,25	16,75	12,25	12,75	10,4	28,3	12,25	12,75	6,0
E43/21/11	42,2	43,5	20,77	21,43	10,55	11,05	15,0	30,4	11,65	12,15	5,9
E43/21/15	42,2	43,5	20,77	21,43	15,10	15,70	15,0	30,4	11,65	12,15	5,9
E43/21/20	42,2	43,5	20,77	21,43	19,59	20,41	15,0	30,4	11,65	12,15	5,9
E55/28/21	54,1	55,7	27,15	28,01	20,19	21,01	18,5	37,5	16,42	17,18	8,4
E55/28/25	54,1	55,7	27,17	28,03	24,13	25,07	18,5	37,5	16,42	17,18	8,4
E65/33/27	64,1	66,1	32,00	33,00	26,47	27,53	22,2	44,2	19,29	20,11	10,0
E72/28/19	71,3	73,5	27,51	28,37	18,66	19,44	17,8	52,6	18,72	19,48	9,6
E80/38/20	78,8	81,2	37,50	38,70	19,39	20,21	28,1	59,3	19,39	20,21	9,9
E80/45/20	78,8	81,2	43,89	45,29	19,39	20,21	34,4	59,3	19,39	20,21	9,9
E130/33/54	128,3	132,3	32,00	33,00	52,90	54,80	22,0	108,4	19,59	20,41	10,0
E160/38/40	157,5	162,5	37,50	38,70	38,90	40,30	28,1	138,2	19,40	20,20	9,9



When new cores are designed, the tolerance ranges of dimensions should be calculated as follows:

Tolerance range of dimension  $A$  is approximately 3,0 % of the centre value of dimension  $A$ .

Tolerance range of dimension  $B$  is approximately 3,0 % of the centre value of dimension  $B$ .

Tolerance range of dimension  $C$  is approximately 3,5 % of the centre value of dimension  $C$ .

Tolerance range of dimension  $F$  is approximately 4,0 % of the centre value of dimension  $F$ .

For the dimensions  $B$ ,  $C$  or  $F$  of 5 mm or less, the tolerance range may be larger than the recommended values.

<sup>a</sup> The core size designation consists of three parts; the first indicates the length  $A$  of the core, the second its width  $B$  and the third its thickness  $C$ .

#### 4.2.2 Effective parameter and $A_{\min}$ values

The effective parameter values of a pair of cores having the dimensions given in 4.2.1 are as shown in Table 2. For the definitions of these parameters and their calculations, see IEC 60205.

**Table 2 – Effective parameter and  $A_{\min}$  values**

Size	$C_1$ mm <sup>-1</sup>	$C_2$ mm <sup>-3</sup>	$l_e$ mm	$A_e$ mm <sup>2</sup>	$V_e$ mm <sup>3</sup>	$A_{\min}^a$ mm <sup>2</sup>
E13/6/4	2,300 8	0,179 42	29,5	12,8	378	12,7 C
E19/8/5	1,730 7	$7,501 9 \times 10^{-2}$	39,9	23,1	921	22,8 C
E25/10/6	1,189 0	$2,943 3 \times 10^{-2}$	48,0	40,4	1 940	40,3 C, B
E30/15/7	1,074 2	$1,775 9 \times 10^{-2}$	65,0	60,5	3 930	49,1 C
E35/14/9	0,828 57	$9,895 4 \times 10^{-3}$	69,4	83,7	5 810	82,3 L, B
E41/17/13	0,511 62	$3,375 9 \times 10^{-3}$	77,5	152	11 800	149 B
E43/21/11	0,767 97	$5,993 5 \times 10^{-3}$	98,4	128	12 600	127 L
E43/21/15	0,538 58	$2,947 7 \times 10^{-3}$	98,4	183	18 000	182 L
E43/21/20	0,414 70	$1,747 7 \times 10^{-3}$	98,4	237	23 300	236 L
E55/28/21	0,349 70	$9,938 0 \times 10^{-4}$	123	352	43 300	346 C, L
E55/28/25	0,292 73	$6,962 2 \times 10^{-4}$	123	420	51 800	413 C, L
E65/33/27	0,271 34	$5,031 7 \times 10^{-4}$	146	539	78 900	532 C
E72/28/19	0,368 86	$9,961 3 \times 10^{-4}$	137	370	50 600	365 C
E80/38/20	0,471 14	$1,203 6 \times 10^{-3}$	184	391	72 200	390 B
E80/45/20	0,533 46	$1,355 7 \times 10^{-3}$	210	393	82 600	392 C, L
E130/33/54	0,192 44	$1,756 8 \times 10^{-4}$	211	1 100	231 000	1 080 C, L
E160/38/40	0,338 12	$4,323 6 \times 10^{-4}$	264	782	207 000	780 B

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

NOTE 2 The above values have been calculated using the method given in IEC 60205. For the dimension values of  $D$  and  $E$  used when calculating the effective parameters,  $D = (\text{minimum dimension } D) + 0,15$  and  $E = ((\text{maximum dimension } A) + (\text{minimum dimension } A)) / 2 - 2 \times (\text{nominal dimension } L)$  are used.

NOTE 3 Because of the magnetic leakage effect, the actual inductance factors of the E-cores will be higher than those calculated based on the effective parameters. The lower the permeability of the core, the more significant the magnetic leakage effect, and the larger the difference between the actual value and the calculated value of the inductance factor.

<sup>a</sup> See IEC 60205 for the definition of  $A_{\min}$ . The letters after the  $A_{\min}$  values give the location of  $A_{\min}$ : C is the centre leg, L is the outer leg and B is the back wall.

### 4.3 Dimensional limits for coil formers

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

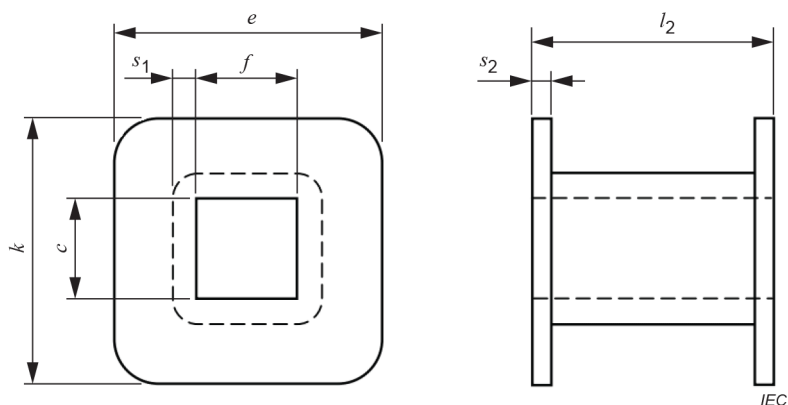


Figure 2 – Main dimensions of coil formers for E-cores

Table 3 – Dimensional limits for coil formers for E-cores

Size	<i>c</i>	<i>e</i>	<i>f</i>	<i>k</i>	<i>l<sub>2</sub></i>	<i>s<sub>1</sub></i>	<i>s<sub>2</sub></i>
	mm	mm	mm	mm	mm	mm	mm
	Min.	Max.	Min.	Min.	Max.	Min.	Min.
E13/6/4	3,85	8,70	3,85	8,70	8,65	0,5	0,5
E19/8/5	5,1	13,7	5,1	13,7	10,8	0,5	0,5
E25/10/6	6,7	18,6	6,7	18,6	12,2	0,8	0,8
E30/15/7	7,4	19,3	7,4	19,3	19,2	0,8	0,8
E35/14/9	9,8	25,1	9,8	25,1	18,9	0,8	0,8
E41/17/13	13,0	28,0	13,0	28,0	20,5	0,8	0,8
E43/21/11	11,3	30,1	12,5	28,9	29,7	0,8	0,8
E43/21/15	16,0	30,1	12,5	33,6	29,7	0,8	0,8
E43/21/20	20,7	30,1	12,5	38,3	29,7	0,8	0,8
E55/28/21	21,4	37,1	17,5	41,0	36,6	1,0	1,0
E55/28/25	25,5	37,1	17,5	45,1	36,6	1,0	1,0
E65/33/27	28,0	43,7	20,5	51,1	43,9	1,0	1,0
E72/28/19	19,9	52,0	20,0	52,0	35,1	1,0	1,0
E80/38/20	20,8	58,6	20,8	58,6	55,6	1,0	1,0
E80/45/20	20,8	58,6	20,8	58,6	68,8	1,0	1,0
E130/33/54	55,4	107	21,1	141	43,4	1,2	1,2
E160/38/40	40,8	137	20,9	157	55,6	1,2	1,2

## 5 Limits of surface irregularities

### 5.1 General

Surface irregularities are defined in IEC 63182-1.