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Ferrite cores – Guidelines on dimensions and the limits of surface irregularities –

Part 5: EP-cores and associated parts for use in inductors and transformers

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Noyaux ferrites – Lignes directrices relatives aux dimensions et aux limites des irrégularités de surface – IEC 63093-5:2018

Partie 5: Noyaux EP et pièces associées utilisés dans les inductances et transformateurs 5f01-4ff7-a6d8-b653754f070a/iec-63093-5-2018



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FERRITE CORES – GUIDELINES ON DIMENSIONS
AND THE LIMITS OF SURFACE IRREGULARITIES –****Part 5: EP-cores and associated parts for use
in inductors and transformers**

FOREWORD

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International Standard IEC 63093-5 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 62317-5 published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62317-5:2015:

- a) addition of the limits of surface irregularities.

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

CDV	Report on voting
51/1212/CDV	51/1233/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

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- withdrawn,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

Part 5: EP-cores and associated parts for use in inductors and transformers

1 Scope

This part of IEC 63093 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of EP-cores made of ferrite, the essential dimensions of coil formers to be used with them and the locations of their terminal pins on a 2,50 mm printed wiring grid in relation to the base outlines of the cores and the effective parameter values to be used in calculations involving them. It also gives guidelines on allowable limits of surface irregularities applicable to EP-cores.

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

The general considerations upon which the design of this range of cores is based are as given 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 purposes of this document, the terms and definitions given in IEC 60401-1 and IEC 60424-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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4 Primary dimensions

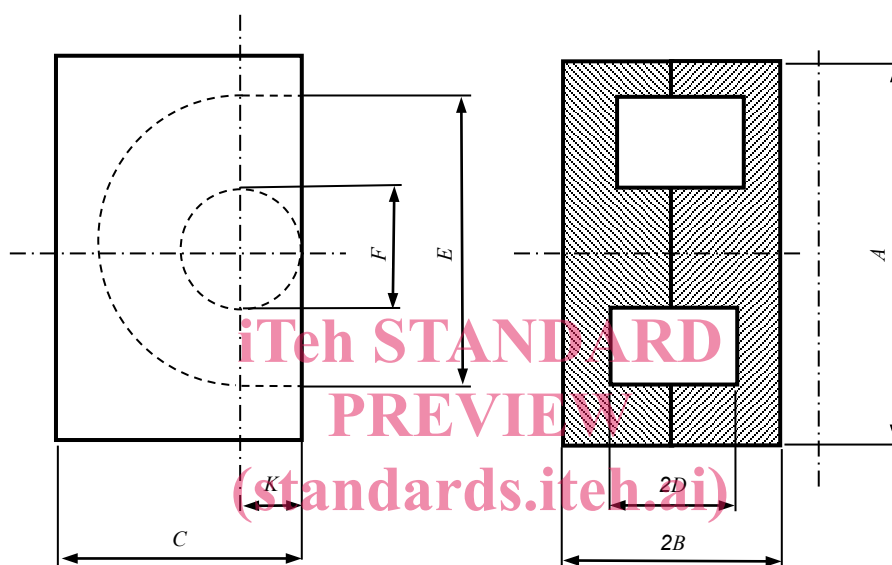
4.1 General

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

4.2 Dimensions of EP-cores

4.2.1 Principal dimensions

The principal dimensions of EP-cores shall be those given in Figure 1 and Table 1.



IEC 63093-5:2018
<https://standards.iteh.ai/catalog/standards/sist/b3f703bd-5901-46f7-a618-b6537546070/iec-63093-5-2018>
 Figure 1 – Principal dimensions of EP-cores

IEC

Table 1 – Principal dimensions of EP-cores

Size	A mm		C mm		K mm	E mm		F mm		2B mm		2D mm	
	Min.	Max.	Min.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
EP5	5,85	6,15	3,70	3,90	1,00	4,25	4,55	1,60	1,80	5,50	5,70	3,80	4,20
EP7	9,00	9,40	6,20	6,50	1,80	7,20	7,60	3,20	3,40	7,30	7,50	5,00	5,40
EP10	11,2	11,8	7,45	7,85	1,95	9,20	9,60	3,15	3,45	10,0	10,4	7,20	7,60
EP13	12,2	12,8	8,60	9,00	2,50	9,70	10,3	4,20	4,50	12,7	13,0	9,00	9,40
EP17	17,6	18,4	10,75	11,25	3,45	11,6	12,4	5,50	5,85	16,6	17,0	11,0	11,6
EP20	23,5	24,5	14,6	15,3	4,70	16,1	16,9	8,50	9,00	21,2	21,6	14,0	14,6
EP30	30,5	31,5	22,6	23,6	7,85	23,6	24,4	14,5	15,0	29,7	30,0	23,0	23,8

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, reference shall be made to IEC 60205.

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

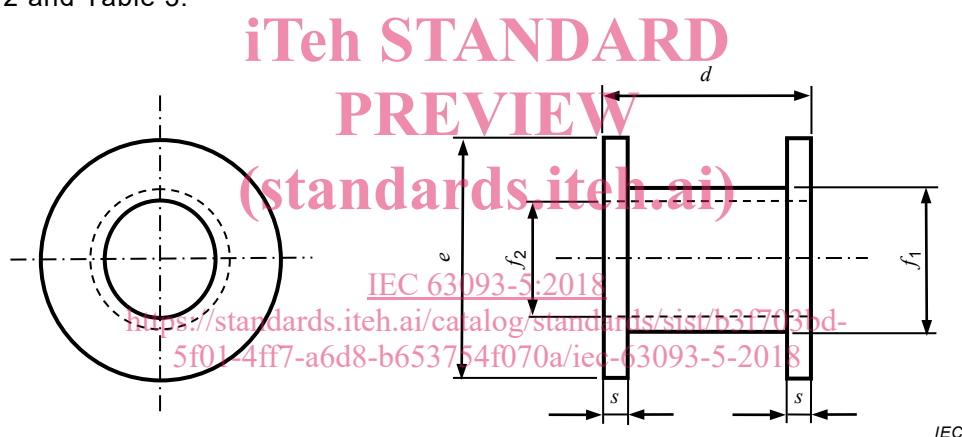
Size	C_1 mm ⁻¹	C_2 mm ⁻³	l_e mm	A_e mm ²	V_e mm ³	A_{\min}^a mm ²
EP5	3,255 8	$1\ 080,4 \times 10^{-3}$	9,81	3,01	29,6	2,27
EP7	1,479 9	$138,76 \times 10^{-3}$	15,8	10,7	168	8,55
EP10	1,726 5	$152,21 \times 10^{-3}$	19,6	11,3	222	8,55
EP13	1,264 2	$64,783 \times 10^{-3}$	24,7	19,5	481	14,9
EP17	0,854 96	$25,187 \times 10^{-3}$	29,0	33,9	985	25,3
EP20	0,518 14	$6,603\ 8 \times 10^{-3}$	40,7	78,5	3 190	60,1
EP30	0,353 76	$1,990\ 1 \times 10^{-3}$	62,9	178	11 200	128

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

^a A_{\min} is selected as the smallest value among A_1, A_2, A_3, A_4 and A_5 using the mean value of each dimension.

4.3 Dimensional limits for coil formers

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

**Figure 2 – Main dimensions of coil formers for EP-cores****Table 3 – Dimensional limits for coil formers for EP-cores**

Size	e mm		f_1 mm		f_2 mm		d mm		s mm	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
EP5	4,00	4,20	2,65	2,85	1,85	2,05	3,50	3,70	0,30	0,50
EP7	6,70	7,00	4,30	4,70	3,60	3,80	4,45	4,75	0,60	0,80
EP10	8,60	9,00	4,65	4,95	3,60	3,80	6,70	7,00	0,50	0,70
EP13	9,30	9,60	5,55	5,85	4,60	4,80	8,60	8,90	0,45	0,65
EP17	11,1	11,4	7,05	7,35	6,00	6,30	10,6	10,9	0,55	0,75
EP20	15,6	15,9	10,0	10,3	9,10	9,40	13,5	13,9	0,55	0,75
EP30	23,1	23,5	16,7	17,0	15,1	15,4	22,5	22,9	0,80	1,00

4.4 Pin locations and base outlines

Pin locations and base outlines shall be as shown in Figure 3, in which the base is viewed in the mounting direction, i.e. from the upper side of the printed wiring board, and in Figure 4, in which the base is viewed from the pin side, i.e. from the underside of the printed wiring board.

Dimensions in millimetre

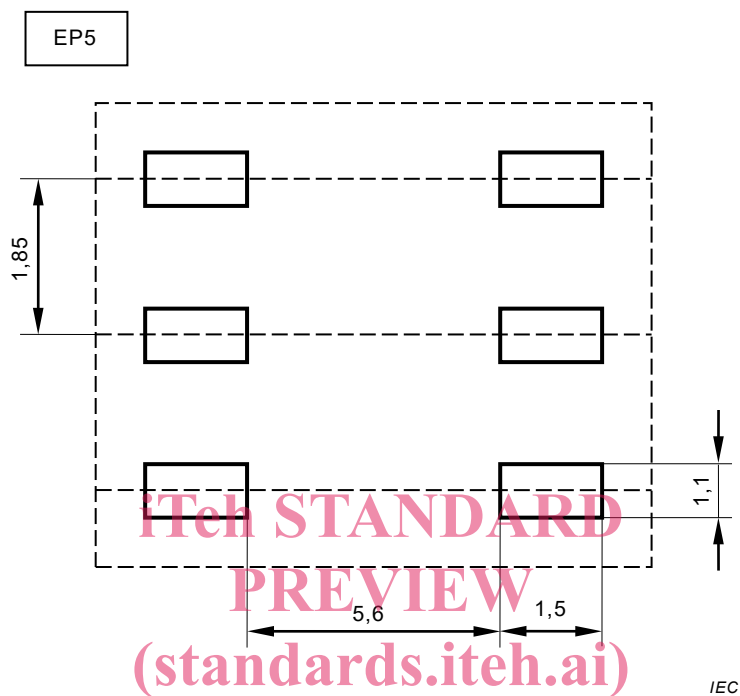
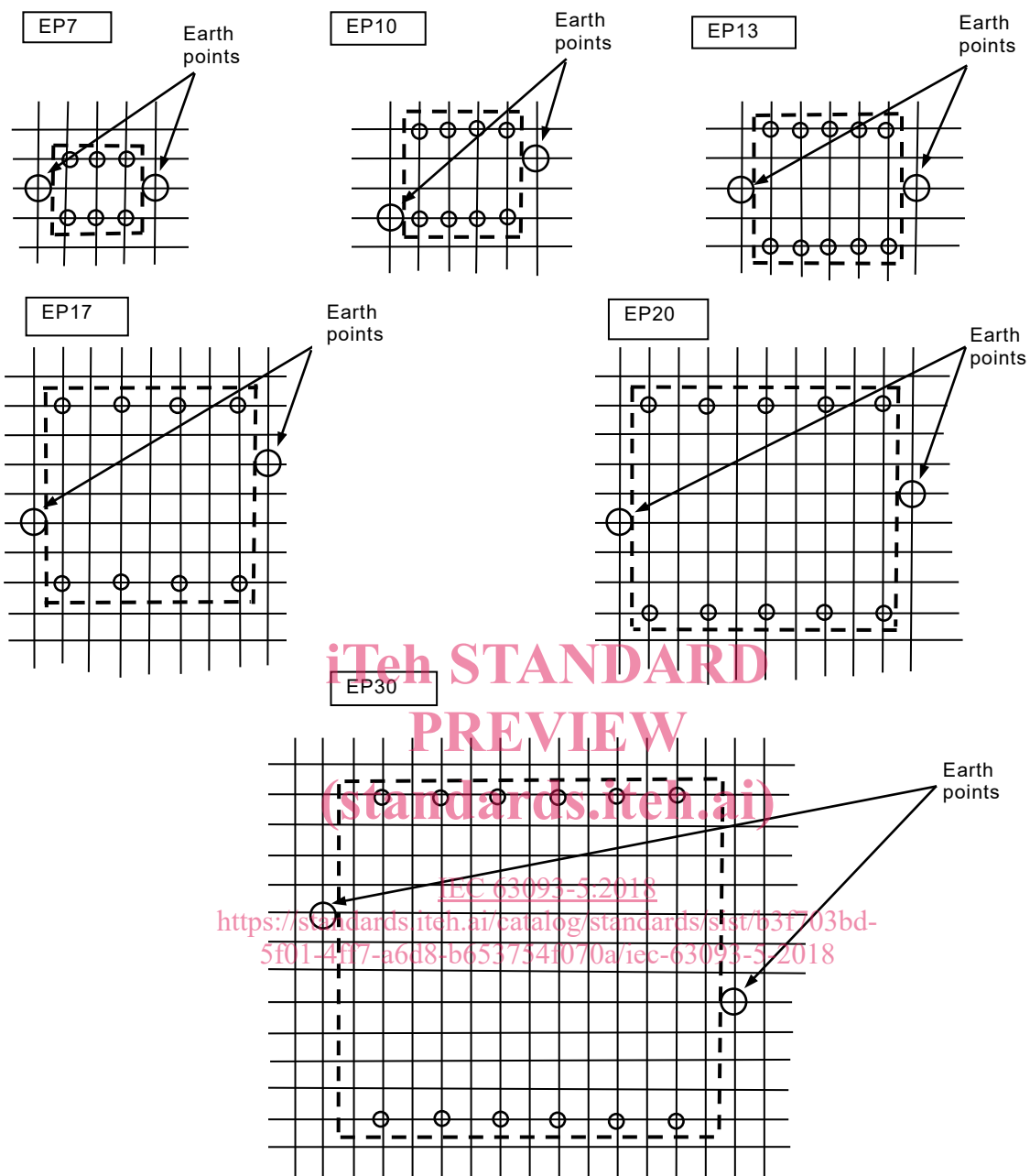


Figure 3 – Pin locations (SMD type) viewed from the upper side of the board
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NOTE 2,50 mm grids.

Figure 4 – Pin locations (PTH type) viewed from the underside of the board

5 Limits of surface irregularities

5.1 General

Surface irregularities are defined in IEC 60424-1.

5.2 Examples of surface irregularities

Figure 5 shows different examples of surface irregularities of an EP-core.

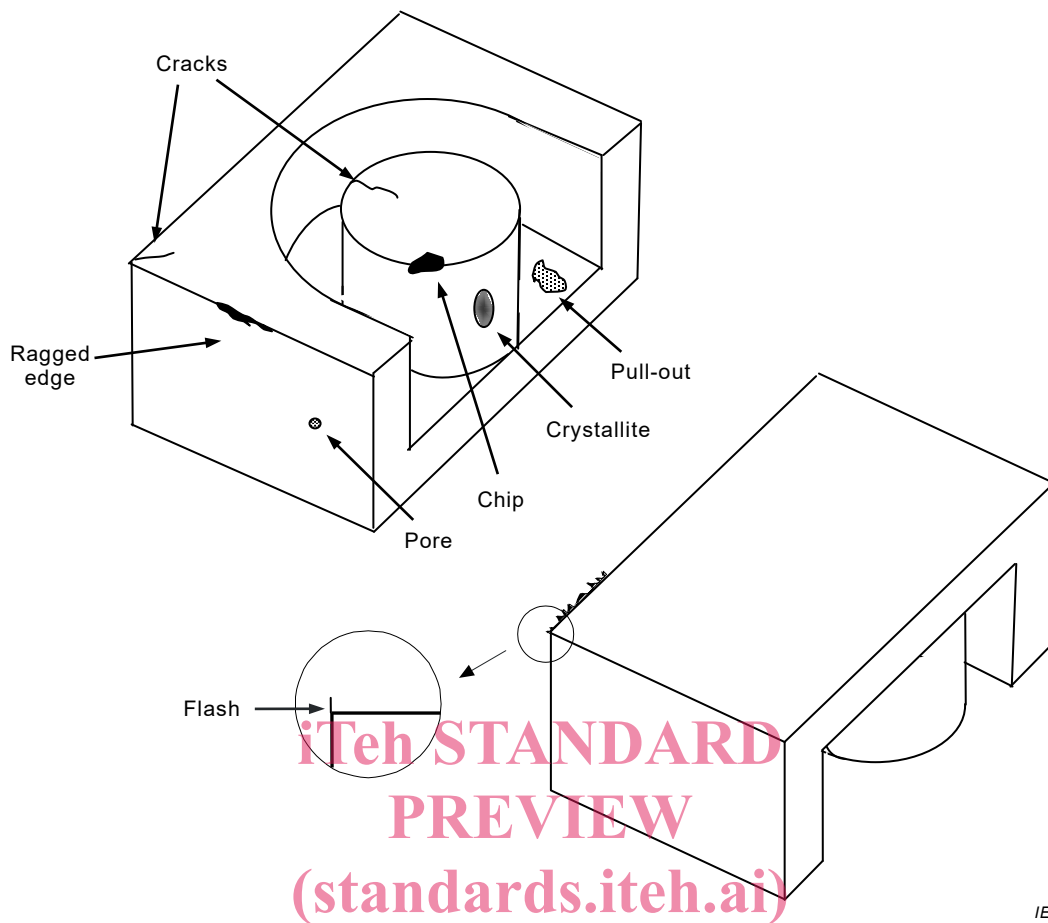


Figure 5 – Examples of surface irregularities

5.3 Chips and ragged edges

5.3.1 General

The minimum area is taken as 0,5 mm², to be distinguishable to the naked eye.

5.3.2 Chips and ragged edges on the mating surfaces

The areas of the chips located on the mating surfaces (chip 1 and chip 1' irregularities in Figure 6) shall not exceed the following limits:

- the cumulative area of the chips shall be less than 4 % of the relevant mating surface. The mating surface of ring and centre pole are considered separately;
- the total length of the ragged edges shall be less than 25 % of the perimeter of the relevant surface.

5.3.3 Chips and ragged edges on the other surfaces

The allowable areas of chips on the other surfaces are doubled as compared to the limits for the mating surface of the ring (outer leg); see Figure 6. The rule for ragged edges is the same as that for the mating surface.