IEC 63093-10

Edition 1.0 2022-04

INTERNATIONAL STANDARD

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Ferrite cores – Guidelines on dimensions and the limits of surface irregularities –
Part 10: PM-cores and associated parts

Noyaux ferrites – Lignes directrices relatives aux dimensions et aux limites des irrégularités de surface –
Partie 10: Noyaux PM et parties associées

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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

Part 10: PM-cores and associated parts

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IEC 63093-10 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials. It is an International Standard.

This first edition cancels and replaces the first edition IEC 61247 published in 1995. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the first edition of IEC 61247:

a) the calculations of the effective parameter values have been updated according to IEC 60205;
b) added the limits of surface irregularities.

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

Draft	Report on voting
51/1388/CDV	51/1408/RVC

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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

Part 10: PM-cores and associated parts

1 Scope

This part of IEC 63093 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of PM-cores made of magnetic oxides, the main dimensions for coil formers to be used with these cores and the locations of their pins on a modular printed wiring grid in relation to the base outlines of cores. It also specifies the effective parameter values to be used in calculations and gives guidelines on allowable limits of surface irregularities applicable to the PM-cores.

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

2 Normative references

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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*

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

IEC 63093-1:2020, *Ferrite 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 60401-1 and IEC 63093-1 apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

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 PM-cores

4.2.1 Principal dimensions

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

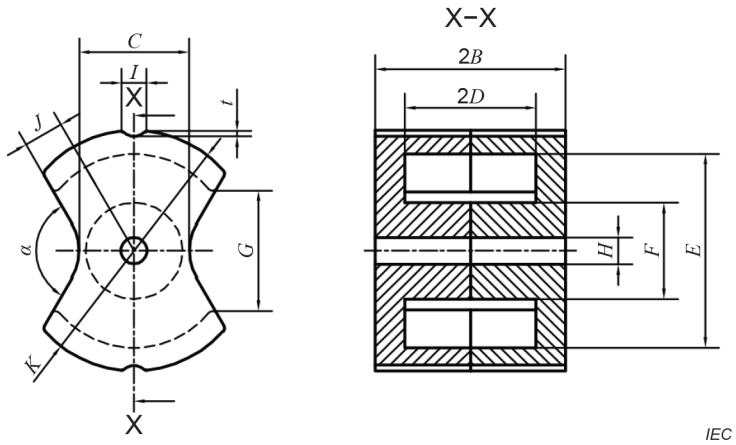

Figure 1 – Main dimensions of PM-cores

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Table 1 – Main dimensions of PM-cores

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Dimension		Size				
		PM 50/39	PM 62/49	PM 74/59	PM 87/70	PM 114/93
K	max.	50,0	62,0	74,0	87,0	114,0
mm	min.	48,3	60,0	71,5	84,0	109,5
E	max.	40,3	50,3	59,3	69,2	91,7
mm	min.	39,0	48,8	57,5	67,1	88,0
F	max.	20,0	25,5	29,5	31,7	43,0
mm	min.	19,4	24,7	28,5	30,7	41,6
H	max.	5,7	5,7	5,7	8,8	5,8
mm	min.	5,4	5,4	5,4	8,5	5,4
2B	max.	39,0	49,0	59,0	70,0	93,0
mm	min.	38,6	48,6	58,4	69,2	92,0
2D	max.	27,2	34,2	41,5	48,8	64,6
mm	min.	26,4	33,4	40,7	48,0	63,0
C	max.	23,0	28,5	33,0	36,0	45,0
mm	min.	22,0	27,5	32,0	35,0	44,0
α	max.	125	125	125	95	95
degree	min.	115	115	115	85	85
J	max.	7,8	10,5	13,5	8,3	11,5
mm	min.	6,8	9,5	12,5	7,3	10,5
G	max.	23,4	29,0	34,0	40,0	52,0
mm	min.	22,4	28,0	33,0	39,0	51,0
t	max.	1,6	1,6	2,9	3,9	4,4
mm	min.	1,2	1,2	2,5	3,5	4,0
I	max.	5,0	5,0	5,0	5,5	6,3
mm	min.	4,0	4,0	4,0	4,5	5,3

The dimensions of the cores can be checked by means of gauges. By way of example, a possible standard for these gauges is given in Annex B. In order to facilitate production it can be necessary to use gauges having dimensions differing from those given in Annex B, although no relaxation of the requirements for the dimensions of the cores given in 4.2.1 is thereby permitted.

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4.2.2 Effective parameter and A_{min} values

The effective parameter and A_{min} values for PM-cores whose dimensions comply with 4.2.1 shall be as given in Table 2. The definitions of effective parameters and their calculations shall be as given in IEC 60205.

Table 2 – Effective parameter and A_{min} values

Size	C_1	C_2	l_e	A_e	V_e	A_{min} [a]
	mm^{-1}	$\times 10^{-3}\ mm^{-3}$	mm	mm^2	mm^3	mm^2
PM 50/39	0,280 49	0,856 46	91,9	327	30 100	281
PM 62/49	0,219 52	0,415 09	116	529	61 000	470
PM 74/59	0,186 88	0,250 48	139	746	104 000	630
PM 87/70	0,186 10	0,217 24	159	857	137 000	700
PM 114/93	0,132 85	0,082 050	215	1 620	348 000	1 380

[a] A_{min} is located at the centre pole only.

4.3 Main dimensions of coil formers

The main dimensions of coil formers shall be as given in Figure 2 and Table 3.

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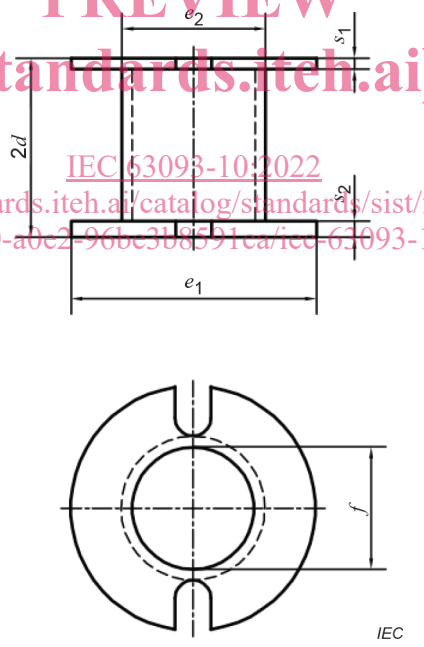

Figure 2 – Main dimensions of coil formers

Table 3 – Main dimensions of coil formers

Dimension		Size				
		PM 50/39	PM 62/49	PM 74/59	PM 87/70	PM 114/93
e_1	max.	38,6	48,5	57,2	66,4	87,3
mm	min.	38,2	48,1	56,7	65,8	86,0
e_2	max.	23,4	28,7	32,7	35,2	48,2
mm	min.	23,0	28,3	32,3	34,7	47,0
f	max.	20,4	26,1	30,3	32,7	44,6
mm	min.	20,2	25,8	29,9	32,1	43,8
$2d$	max.	26,0	33,0	40,0	47,3	62,5
mm	min.	25,6	32,5	39,3	46,5	61,3
s_1	max.	1,25	1,35	1,35	1,55	2,30
mm	min.	0,95	1,05	1,05	1,25	2,00
s_2	max.	1,65	1,65	1,75	1,95	2,50
mm	min.	1,35	1,35	1,45	1,65	2,20

4.4 Pin locations and base outlines

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When coil formers are provided with pins intended for use in conjunction with a printed wiring board, they shall be inserted in the thicker flange (s_2), and their location, numbering and relationship to the core base outline shall be as shown in Figure 3, in which the bases are viewed from the pin side, that is, from the underside of the printed wiring board. The module, designated m, shown in the grid plan should be 2,50 mm.

NOTE The largest core PM 114/93 is not intended to be mounted on terminal pins because of its weight. In this case pins are usually fitted within the cut out of the core.

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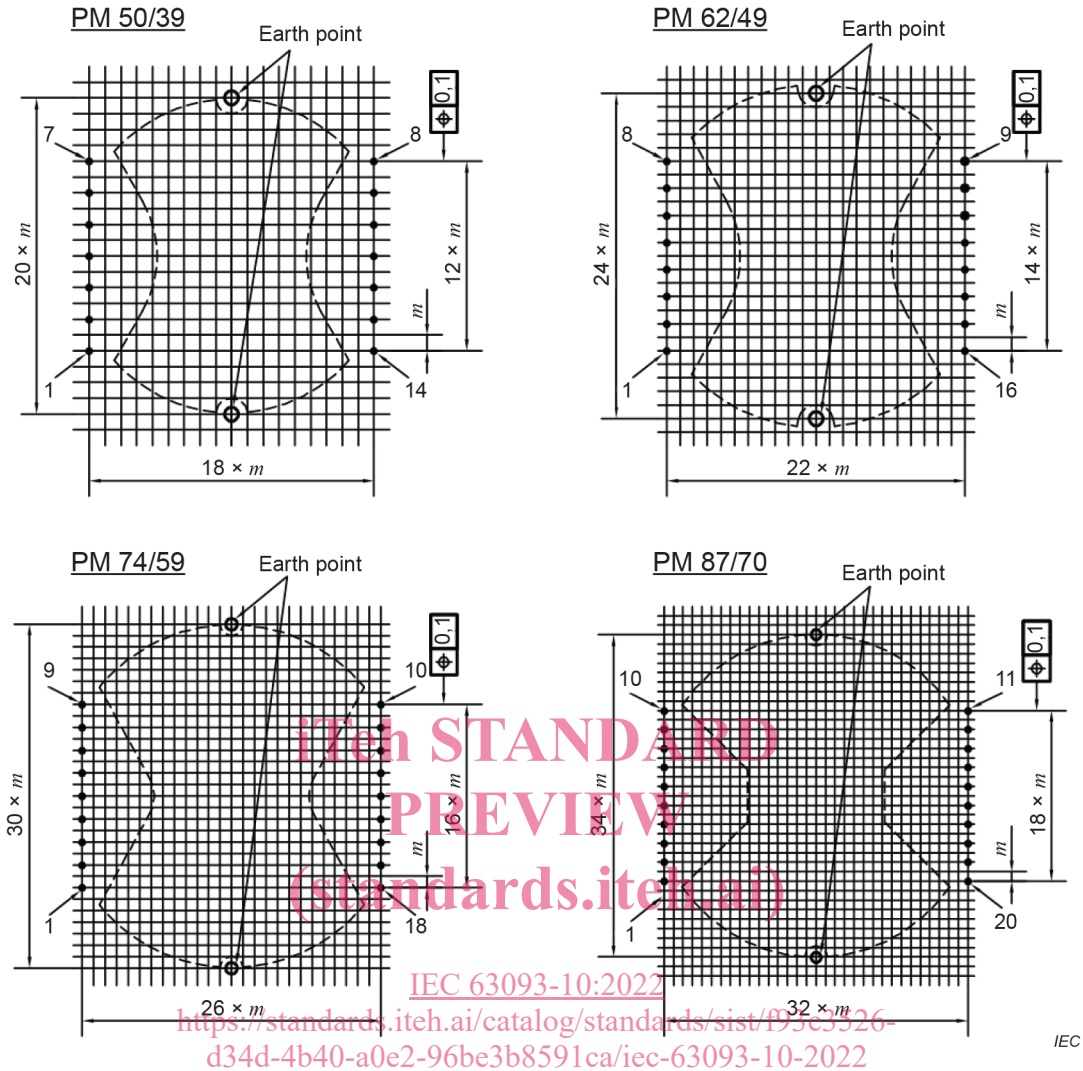
4.5 Pin diameter

Coil former terminations (pins) shall be accepted by a gauge having 1,2 mm holes on specified positions.

5 Mounting hardware

No mounting hardware is specified here, however an example is as given in Annex C.

NOTE Components using PM-cores with fully wound coil formers will normally require mechanical support in addition to their printed wiring board mounting. Details are given in Annex C of an assembly consisting of a 3 mm diameter circular section U-bolt with threaded ends which can be used in conjunction with a 0,6 mm thick base plate. Both components are made from non-magnetic materials. The largest core PM 114/93 has a mass approaching 2 kg before winding. It is not possible, therefore, to recommend any simple mounting method and users are expected to design specific mounting hardware according to their application.



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Key

m module in the grid plan

NOTE 1 The earth point is the holes for U-bolt fixing.

NOTE 2 The location of pin no.1 is identified by a corresponding mark on the upper flange s_1 in Figure 2.

Figure 3 – Pin locations and base outlines viewed from the underside of the board

6 Limits of surface irregularities

6.1 General

Surface irregularities are defined in IEC 63093-1.

6.2 Examples of surface irregularities

Figure 4 shows different examples of surface irregularities on a PM-core.

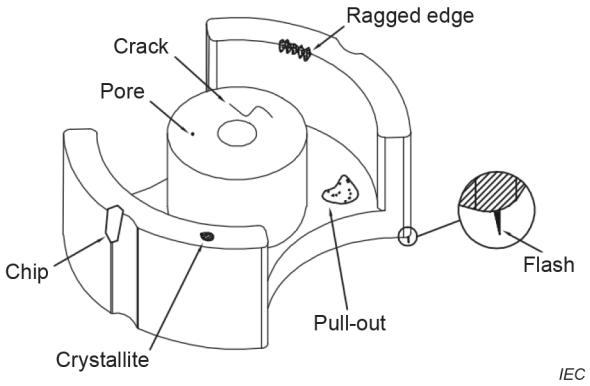

Figure 4 – Examples of surface irregularities

6.3 Chips and ragged edges

6.3.1 General

The minimum chipping area is taken to be 0,5 mm^2, so as to be distinguishable to the naked eye.

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The maximum chipping area is taken to be 50 mm^2 in order not to reduce the commercial value because of its appearance.

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6.3.2 Chips and ragged edges located on the mating surface

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The areas of the chips located on the mating surface (see C1, C1', C1'', R1 and R1' irregularities in Figure 5) shall not exceed the following limits:

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– the cumulative area of the chips located on the mating surface shall be less than 4 % of the total mating surface;
– the cumulative area of the chips located on the centre pole mating surface shall be less than 2 % of the total mating surface;
– the cumulative area of the chips located on the mating surface of one outer leg shall be less than 1 % of the total mating surface.

The total length of the ragged edges shall be less than 25 % of the perimeter of the relevant mating surface.