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INTERNATIONAL STANDARD

Ferrite cores – Dimensions – Part 12: Ring cores

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FOREWORD

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International Standard IEC 62317-12 has been prepared IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials.

This first edition cancels and replaces the first edition of IEC TR 61604 published in 1997. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TR 61604:

a) amendment of Clause 5 concerning the relationship between standard of European, Japanese and U.S.A. sizes;
b) addition of Subclause 5.3 concerning coating.

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

CDV	Report on voting
51/1128/CDV	51/1143/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 of the IEC 62317 series, under the general title *Ferrite cores – Dimensions*, 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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

FERRITE CORES – DIMENSIONS –

Part 12: Ring cores

1 Scope

This part of IEC 62317 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of ring-cores, also called toroid cores, and the effective parameter values to be used in calculations involving them.

The selection of core sizes for this document is based on the philosophy of including those sizes which are industrial standards, meaning that they are in broad-based use within industry. See IEC 62317-1 for more detail concerning the philosophy of selecting core sizes to be included.

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*

3 Terms and definitions

No terms and definitions are listed in this document.

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 Abbreviated terms

ID inside diameter

OD outside diameter

5 Primary standards

5.1 General

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

5.2 Dimensions of ring-cores

5.2.1 Designation of dimensions

Table 1 describes the alphabetic character assignments for the dimensions of ferrite ring cores.

Table 1 – Ring core dimension designations

Letter	Dimension description
A	Outside diameter
B	Inside diameter
C	Height

5.2.2 Identification of standard sizes

Table 2 shows the nominal dimensions for the range of standard ring cores. Table 2 also shows, where applicable, the origin and regional name of each standard size, whether from historical European sizes, historical Japanese sizes, or historical USA sizes. The previous IEC Technical Report, 61604, detailed the different ring sizes that were tooled and commonly used in the three distinct geographic regions. IEC TR 61604 laid the groundwork for the present standard, which reflects the more global nature of the industry, compared with the time when ferrite standards were evolving in different parts of the world. Manufacturers tend to have more globally complete offerings of ring sizes than before, leading to a profusion of different sizes.

The number of different ring sizes used in total is quite large, far in excess of the 82 commonly known standard sizes shown here, for a couple of reasons: ring cores are relatively inexpensive to build tooling for, nor does a new ring core require an expensive new coil former to be tooled up, meaning that custom ring cores are often commercially practical. Ferrite rings, lacking a residual air gap, such as E-cores and other shapes have at their mating surfaces, exhibit directly the full magnetic performance possible in the ferrite material, meaning that tooling up precisely optimal new dimensions can give a significant advantage to a designer who is optimizing for best possible performance.

5.2.3 Effective parameter values

The effective parameter values for the standard ring cores are given in Table 3. For global practicality and simplicity, the effective parameters in this document are calculated from the nominal dimensions assuming cores of rectangular cross section, and are useful for reference and comparison of cores. For cores having a cross section with an appreciable average rounding radius, more precise values can be calculated from the method given in IEC 60205, if required.

5.2.4 Dimensional limits for standard sizes

The standard tolerance limits for uncoated ring cores are given in Table 4. Manufacturers may choose to offer looser standard limits for ferrite materials that exhibit greater process variability, or tighter limits for applications that justify higher processing and yield costs to achieve narrower dimensional range.

The limits take account of shrinkage variation and warping during firing. The specification for out-of-round condition of the inner or outer circumference is that the inside diameter (ID) and outside diameter (OD) must stay within the indicated limits, measured at any point. Similarly, the specification for non-flat condition of the sides of a ring is that the height minimum and maximum must be achieved at all points.

Table 2 – Standard ring cores *(1 of 3)*

Nominal uncoated dimensions			Size reference
A mm	*B* mm	*C* mm	
2,5	1,3	1,3	
2,5	1,5	0,8	
2,5	1,5	1,0	Europe R2,5
3,1	1,3	1,3	
3,1	1,8	2,0	
3,5	1,8	1,3	
3,9	1,8	1,8	
3,9	2,2	1,3	USA T3,9
4,0	2,0	2,0	
4,0	2,2	1,6	Europe R4
4,83	2,29	1,27	USA T4,8
5,84	3,05	1,52	USA T5,8
6,0	3,0	2,0	
6,0	4,0	2,0	
6,3	3,8	2,5	Europe R6,3
7,62	3,18	4,78	USA T7,6
8,0	4,0	2,0	
8,2	3,7	4,0	
9,0	6,0	3,0	
9,53	4,75	3,18	USA T9,5
10,0	5,0	4,0	
10,0	5,0	5,0	Japan FOR 10
10,0	6,0	4,0	Europe R10
12,0	6,0	4,0	Japan FOR12
12,7	7,1	5,1	
12,7	7,92	6,35	USA T12,7
13,2	7,4	4,0	
13,6	7,0	3,5	
14,0	8,0	7,0	
14,0	9,0	5,0	
15,88	8,89	4,7	USA T15,9
16,0	9,0	5,0	
16,0	9,6	6,3	Europe R16
16,0	12,0	8,0	
18,0	10,0	10,0	Japan FOR 18
18,5	9,8	10,3	Japan FOR 19
20,0	10,0	7,0	Europe R20

Table 2 *(2 of 3)*

Nominal uncoated dimensions			Size reference
A mm	*B* mm	*C* mm	
20,0	12,0	10,0	Japan FOR 20
22,0	14,0	10,0	Japan FOR 22
22,1	13,72	6,35	USA T22,1
25,0	15,0	10,0	Europe R25
25,0	15,0	12,0	Japan FOR 25
25,4	15,49	9,53	USA T25,4
26,9	14,2	12,2	
28,0	16,0	13,0	Japan FOR 28
29,0	19,0	7,49	USA T29,0
30,8	19,1	12,7	
31,0	19,0	13,0	Japan FOR 31
32,0	19,0	13,0	
36,0	23,0	10,0	USA T36.0
36,0	23,0	15,0	Europe R36
38,0	19,0	13,0	Japan FOR 38
38,0	22,0	13,0	
38,1	19,0	6,35	USA T38,1
40,0	24,0	16,0	Europe R40
40,0	24,0	20,0	
41,8	26,2	18,0	
44,5	30,0	13,0	Japan FOR 45
47,0	27,0	15,0	Japan FOR 47
49,1	31,8	15,9	
49,1	33,8	15,9	
50,0	30,0	20,0	Europe R50
51,0	32,0	19,0	
55,0	32,0	19,0	
58,0	41,0	18,0	
61,0	35,6	12,7	
63,0	38,0	25,0	Europe R63
68,0	48,0	13,0	
72,0	48,0	20,0	
73,7	38,9	12,7	USA T73,7
80,0	40,0	15,0	
80,0	50,0	20,0	
85,7	55,5	12,7	
96,0	70,0	20,0	