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TECHNICAL REPORT

colour inside

Dimensional tolerances of ferrite cores

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INTERNATIONAL
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DIMENSIONAL TOLERANCES OF FERRITE CORES

FOREWORD

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IEC TR 63090, which is a Technical Report, has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
51/1166/DTR	51/1186/RVDTR

Full information on the voting for the approval of this technical report 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.

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- withdrawn,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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document shows the dimensional tolerances of ferrite cores that are generally used by ferrite core suppliers. As a reference, this is useful for ferrite core suppliers and users when they design ferrite cores and/or the components which use the ferrite cores.

IEC has published international standards regarding ferrite core dimensions and their tolerances, as listed in the Table 1, and core sizes in each core shape were chosen from industrial standards from Europe, Japan and USA. However, there are some cases that lack unity in the dimensional tolerances even if ferrite core dimensions are close.

Because many new sizes are still designed for the E, ETD/EER, planar ER and ring core, this document gives information about the dimensional tolerances for reference dimensions of each core shape.

Table 1 – IEC standards of ferrite core dimensions

IEC standard	Current standard
IEC 62317-1, *Ferrite cores – Dimensions – Part 1: General specification*	///
IEC 62317-2, *Ferrite cores – Dimensions – Part 2: Pot-cores for use in telecommunications, power supply, and filter applications*	///
IEC 62317-3, *Ferrite cores – Dimensions – Part 3: Half-pot cores* (future standard)	IEC 62323
IEC 62317-4, *Ferrite cores – Dimensions – Part 4: RM-cores and associated parts*	///
IEC 62317-5, *Ferrite cores – Dimensions – Part 5: EP-cores and associated parts for use in inductors and transformers*	///
IEC 62317-6, *Ferrite cores – Dimensions – Part 6: ETD-cores for use in power supplies*	///
IEC 62317-7, *Ferrite cores – Dimensions – Part 7: EER-cores*	///
IEC 62317-8, *Ferrite cores – Dimensions – Part 8: E-cores*	///
IEC 62317-9, *Ferrite cores – Dimensions – Part 9: Planar cores*	///
IEC 62317-10, *Ferrite cores – Dimensions – Part 10: PM cores* (future standard)	IEC 61247
IEC 62317-11, *Ferrite cores – Dimensions – Part 11: EC-cores for use in power supply applications*	///
IEC 62317-12, *Ferrite cores – Dimensions – Part 12: Ring cores*	///
IEC 62317-13, *Ferrite cores – Dimensions – Part 13: PQ-cores for use in power supply applications*	///
IEC 62317-14, *Ferrite cores – Dimensions – Part 14: EFD-cores for use in power supply applications*	///

Cause of variations in dimension

The shrinkage of <Ready to press> powders, the density of mouldings, the deformation of ferrite cores, etc., are considered as causes of variations in dimension.

They are gathered in the following cause-and-effect diagram in Figure 1.

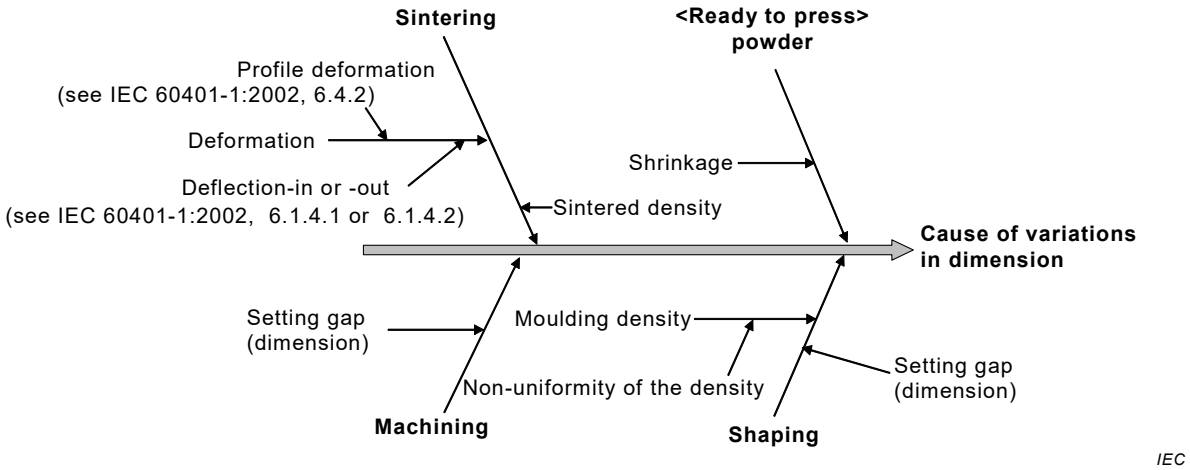


Figure 1 – Cause-and-effect diagram of variations in dimension

Consideration of the dimensional tolerance

The dimensional tolerance is considered according to the processing conditions, and the core part is classified into the following three conditions:

– decided according to the mould and sintering, or
– decided according to the press direction, or
– grinding direction.

DIMENSIONAL TOLERANCES OF FERRITE CORES

1 Scope

This document gives guidelines on the dimensional tolerances of ferrite cores. This document is considered as general information useful in the dialogue between ferrite core suppliers and users.

2 Normative references

There are no normative references in this document.

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 Summary of dimensional tolerances of ferrite cores

4.1 General

Figures 3, 5, 7 and 9 show the plots of the specifications of IEC standards and the catalogues of some ferrite core suppliers. The recommended boundary is the line connected by the supposed maximum points of the specifications of the IEC standards. Most of the points are under the recommended boundary.

4.2 Dimensional tolerances of E-cores

Figure 2 represents typical core geometry with the standard dimension nomenclature applied. Dimensional tolerances to recommend for a new design of E-cores are shown in Table 2. The scatter diagram of dimensional tolerances of each part of E-cores is shown in Figure 3. Dimensional tolerances of each part in the specifications of IEC standards and the catalogues of some ferrite core suppliers are shown in Table A.1.

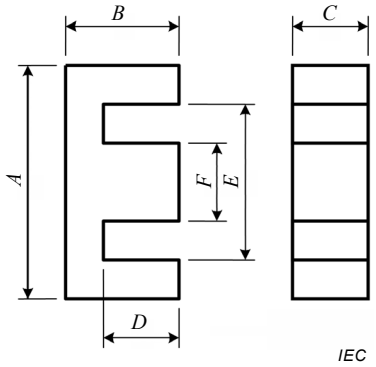
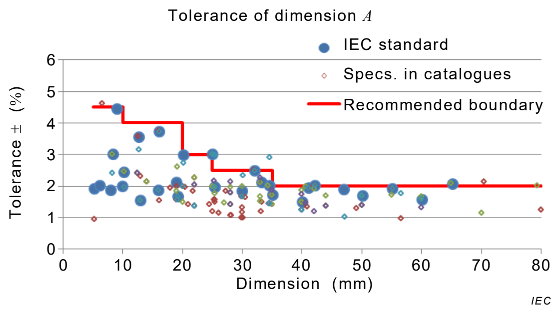


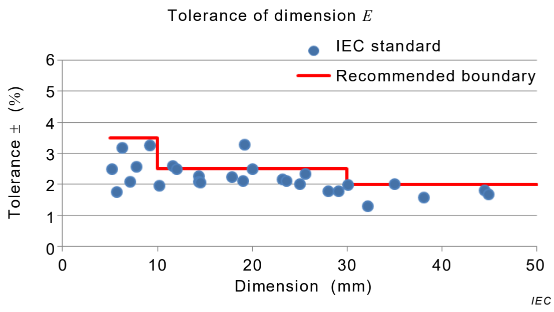
Figure 2 – E-core

Table 2 – Dimensional tolerances recommended for a new design of E-cores

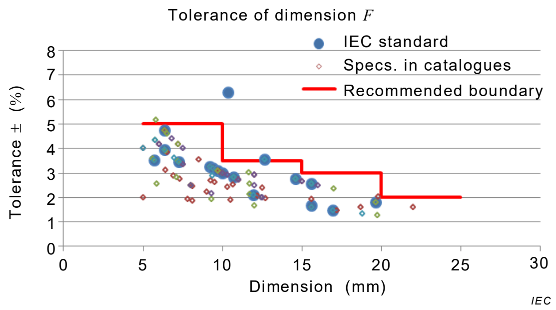
Dimension		Decided according to mould and sintering			Decided according to press direction	Grinding direction	
min	**max**	**dimension *A***	**dimension *E***	**dimension *F***	**dimension *C***	**dimension *B***	**dimension *D***
mm	mm	tolerance ± %	tolerance ± %	tolerance ± %	tolerance ± %	tolerance ± %	tolerance ± %
5 <	≤ 10	4,5	3,5	5,0	5,0	3,0	4,0
10 <	≤ 15	4,0	2,5	3,5	3,0	2,5	3,0
15 <	≤ 20	4,0	2,5	3,0	3,0	2,5	2,5
20 <	≤ 25	3,0	2,5	2,0	2,0	1,5	2,0
25 <	≤ 30	2,5	2,5	–	2,0	1,5	–
30 <	≤ 35	2,5	2,0	–	–	1,0	–
35 <	≤ 40	2,0	2,0	–	–	1,0	–
40 <	≤ 50	2,0	2,0	–	–	–	–
50 <	≤ 80	2,0	–	–	–	–	–



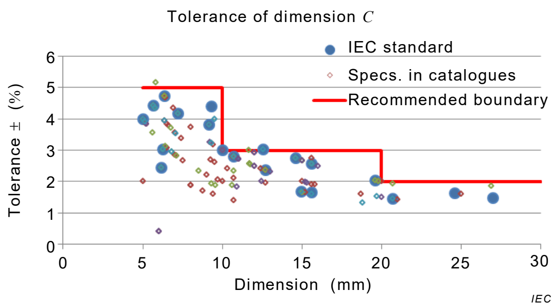
a) **Dimension *A***



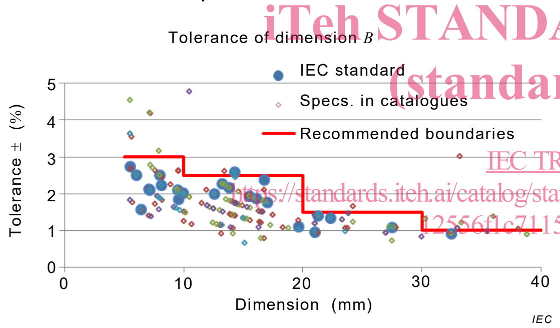
b) **Dimension *E***



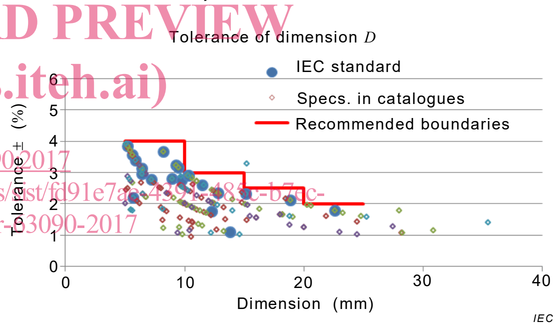
c) **Dimension *F***



d) **Dimension *C***



e) **Dimension *B***



f) **Dimension *D***

Figure 3 – Dimensional tolerances of each part of E-cores

4.3 Dimensional tolerances of ring cores

Figure 4 represents typical core geometry with the standard dimension nomenclature applied. Dimensional tolerances to recommend for a new design of ring cores are shown in Table 3. The scatter diagram of dimensional tolerances of each part of ring cores is shown in Figure 5. Dimensional tolerances of each part in the specifications of IEC standards and the catalogues of some ferrite core suppliers are shown in Table A.2.

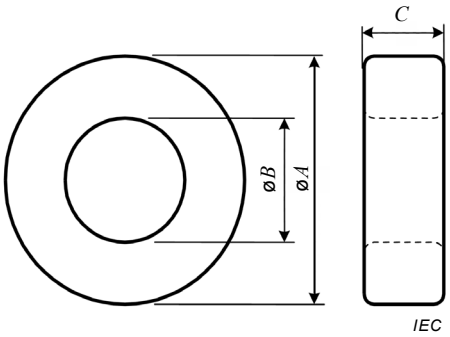
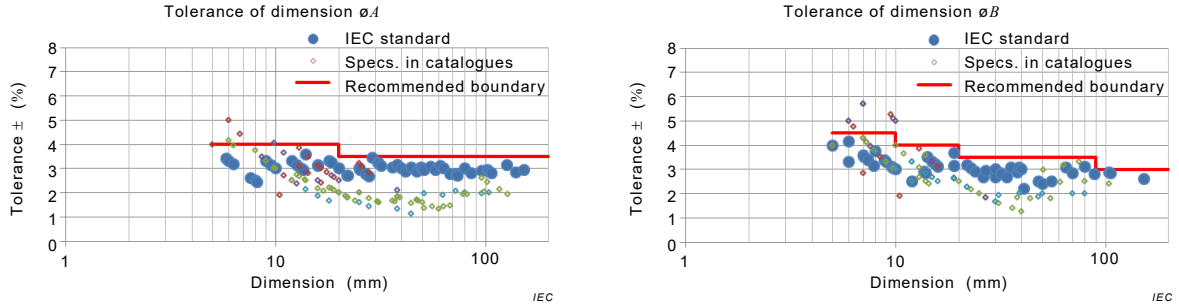


Figure 4 – Ring core

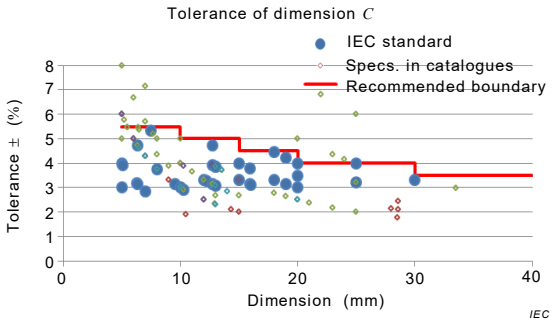
Table 3 – Dimensional tolerances recommended for a new design of ring cores

Dimension		Decided according to mould and sintering		Decided according to press direction
min	**max**	**dimension ϕA**	**dimension ϕB**	**dimension C**
mm	mm	tolerance ± %	tolerance ± %	tolerance ± %
5 <	≤ 10	4,0	4,5	5,5
10 <	≤ 15	4,0	4,0	5,0
15 <	≤ 20	4,0	4,0	4,5
20 <	≤ 30	3,5	3,5	4,0
30 <	≤ 40	3,5	3,5	3,5
40 <	≤ 50	3,5	3,5	–
50 <	≤ 90	3,5	3,5	–
90 <	≤ 200	3,5	3,0	–



a) Dimension ø*A*

b) Dimension ø*B*



c) Dimension *C*

Figure 5 – Dimensional tolerances of each part of ring cores

4.4 Dimensional tolerances of ETD/EER-cores

Figure 6 represents typical core geometry with the standard dimension nomenclature applied. Dimensional tolerances to recommend for a new design of ETD/EER-cores are shown in Table 4. The scatter diagram of dimensional tolerances of each part of ETD/EER-cores is shown in Figure 7. Dimensional tolerances of each part in the specifications of IEC standards and the catalogues of some ferrite core suppliers are shown in Table A.3.

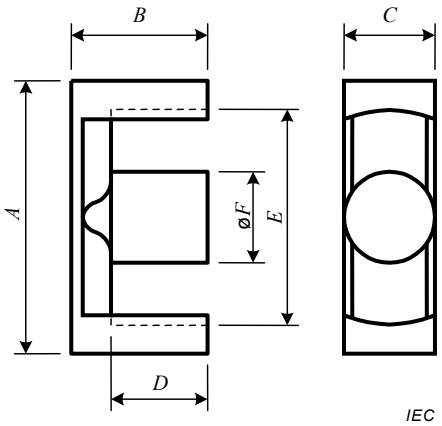
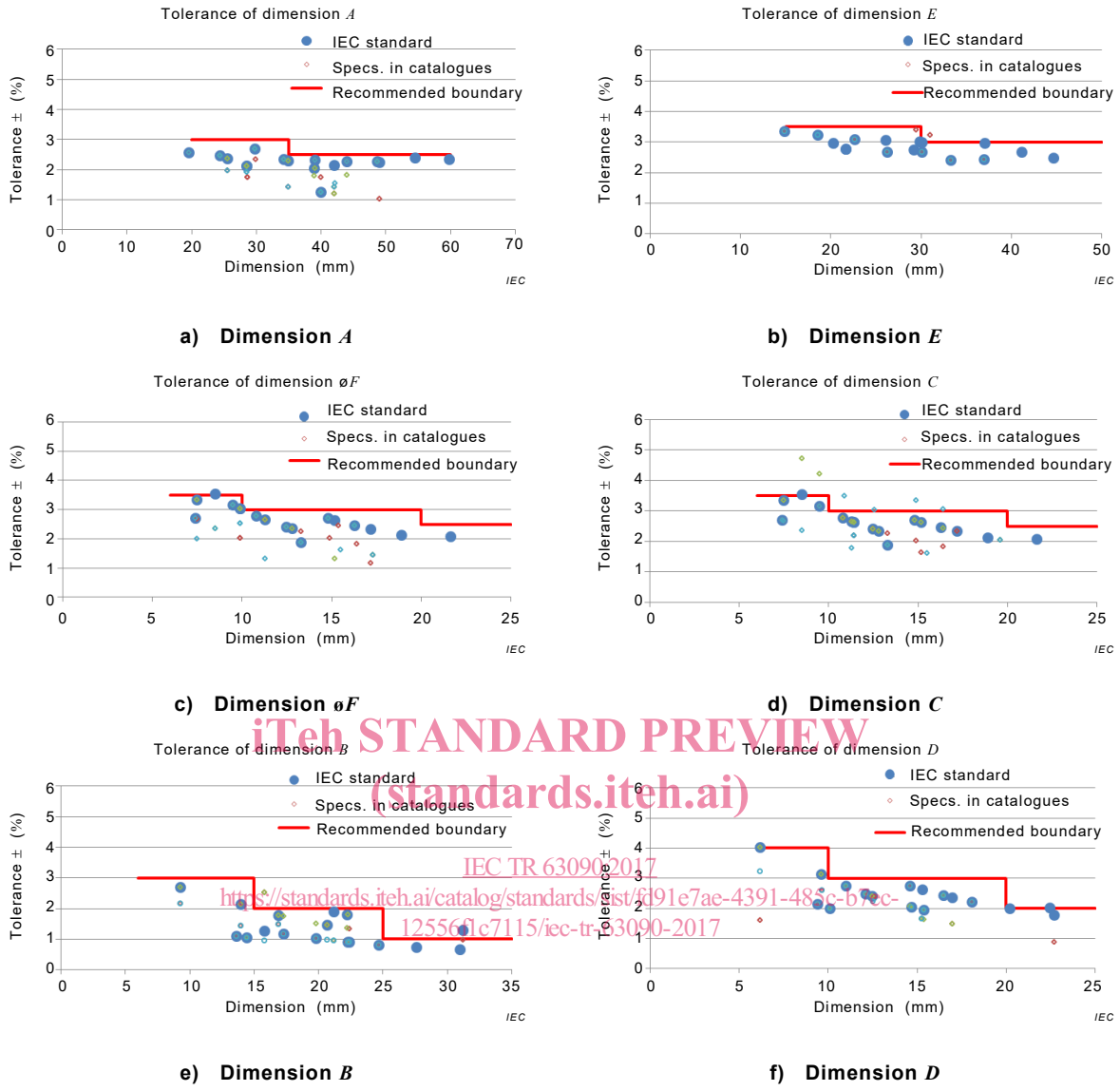


Figure 6 – ETD/EER-core

Table 4 – Dimensional tolerances recommended for a new design of ETD/EER-cores

Dimension		Decided according to mould and sintering				Grinding direction	
min	**max**	**dimension *A***	**dimension *E***	**dimension *ϕF***	**dimension *C***	**dimension *B***	**dimension *D***
mm	mm	tolerance ± %	tolerance ± %	tolerance ± %	tolerance ± %	tolerance ± %	tolerance ± %
6 <	≤ 10	-	-	3,5	3,5	3,0	4,0
10 <	≤ 15	–	-	3,0	3,0	3,0	3,0
15 <	≤ 20	–	3,5	3,0	3,0	2,0	3,0
20 <	≤ 25	3,0	3,5	2,5	2,5	2,0	2,0
25 <	≤ 30	3,0	3,5	–	-	1,0	–
30 <	≤ 35	3,0	3,0	–	–	1,0	–
35 <	≤ 40	2,5	3,0	–	–	–	–
40 <	≤ 50	2,5	3,0	–	–	–	–
50 <	≤ 60	2,5	–	–	–	–	–



a) Dimension *A*

b) Dimension *E*

c) Dimension *øF*

d) Dimension *C*

e) Dimension *B*

f) Dimension *D*

Figure 7 – Dimensional tolerances of each part of ETD/EER-cores

4.5 Dimensional tolerances of planar ER-cores

Figure 8 represents typical core geometry with the standard dimension nomenclature applied. Dimensional tolerances to recommend for a new design of planar ER-cores are shown in Table 5. The scatter diagram of dimensional tolerances of each part of planar ER-cores is shown in Figure 9. Dimensional tolerances of each part in the specifications of IEC standards and the catalogues of some ferrite core suppliers are shown in Table A.4.