

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

Magnetic powder cores – ITC STANDARD PREVIEW  
irregularities –  
Part 2: Ring-cores

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Noyaux en poudre magnétique comprimée – Lignes directrices concernant  
les dimensions et les limites des irrégularités de surface –  
Partie 2: Tores

IEC 63182-2:2020

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IEC 63182-2

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

#### **Part 2: Ring-cores**

#### **FOREWORD**

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International Standard IEC 63182-2 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials.

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

FDIS	Report on voting
51/1348/FDIS	51/1352/RVD

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 IEC 63182 series, published under the general title *Magnetic powder 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

### Part 2: Ring-cores

## 1 Scope

This part of IEC 63182 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of ring-cores (also called toroids) made of magnetic powder, the effective parameter values to be used in calculations involving them, and gives guidelines on allowable limits of surface irregularities applicable to coated ring-cores.

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 the industry. This document is considered as a sectional specification useful in the negotiations between magnetic powder core manufacturers and users about surface irregularities.

## 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 63182-1, *Magnetic powder cores – Guidelines on dimensions and the limits of surface irregularities – Part 1: General specification* IEC 63182-2:2020  
<https://standards.iec.ch/catalog/standards/ssi/07/0130-007-iec63182-1.html>

## 3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 63182-1 and the following 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>

### 3.1

#### chamfered edge

circular or subcircular corner edge of core

Note 1 to entry: To facilitate the winding process, prior to applying the coating, the four sharp corner edges of the ring-cores should be smoothed out using specialized machinery. Alternatively, rounding off some or all of the corner edges can be achieved with rounded tooling components when powder is compacted to form the core.

## 4 Primary standards

### 4.1 General

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

## 4.2 Dimension descriptions

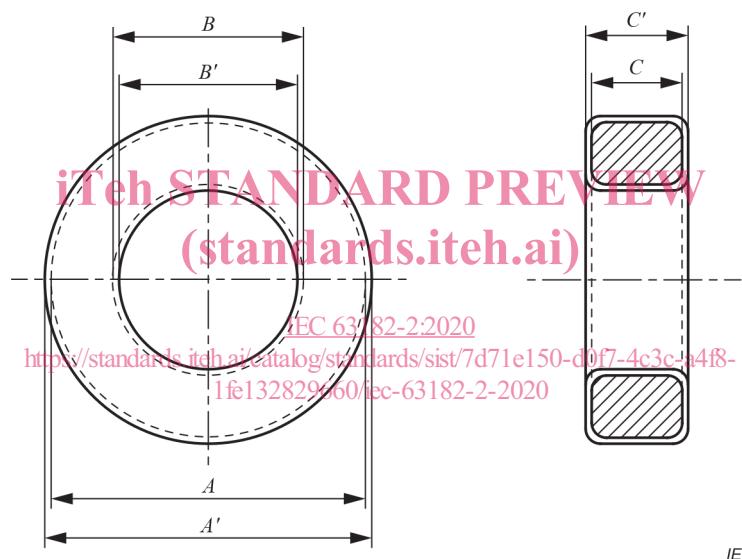
Table 1 describes the alphabetic character assignments for the dimensions of ring-cores. Dimensions may refer to coated or uncoated nominal values, or to limit values.

**Table 1 – Dimensions descriptions**

Letter	Dimensions description
<i>A</i>	Outside diameter
<i>B</i>	Inside diameter
<i>C</i>	Height

## 4.3 Dimensions of ring-cores

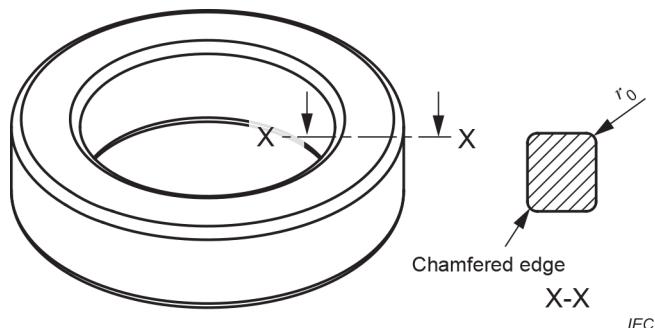
Nominal and limit dimensions (see Figure 2) in widespread use in the industry are given in Table 2.



**Figure 1 – Dimensions of ring-cores**

## 4.4 Chamfered edges

The approximate radius ( $r_0$ , see Figure 2) of each chamfered edge is designed to be large enough to avoid damage to the coating of the typical gauge of the magnet wire that is used for the core size. The value of  $r_0$  may be given as a nominal or minimum value. Typically, the ratio of  $r_0$  to  $A$  is not less than 1/30.



**Figure 2 – Chamfered edges of ring-cores**

#### 4.5 Effective parameter values

The effective parameter values given in Table 2 are calculated from the dimensions of the uncoated ring-cores with minimum chamfered edges ( $r_0/A = 1/30$ ). The calculation method is given in Annex A.

**Table 2 – Dimensions and geometrically calculated values for ring-cores**

Uncoated dimensions			Coated limit dimensions			$I_e$	$A_g^a$ mm <sup>2</sup>	$V_e$ mm <sup>3</sup>
$A$ mm	$B$ mm	$C$ mm	$A'$ mm	$B'$ mm	$C'$ mm			
3,56	1,78	1,52	4,20	1,27	2,16	8,07	1,34	10,8
3,94	2,24	2,54	4,58	1,72	3,18	9,46	2,14	20,3
4,65	2,36	2,54	5,29	1,85	3,18	10,6	2,89	30,6
6,35	2,79	2,79	6,99	2,28	3,43	13,6	4,93	67,0
6,60	2,67	2,54	7,24	2,15	3,18	13,6	4,95	67,5
6,60	2,67	4,78	7,24	2,15	5,42	13,6	9,35	128
6,86	3,96	5,08	7,50	3,45	5,72	16,6	7,32	121
7,87	3,96	3,18	8,51	3,45	3,81	17,9	6,16	110
9,65	4,78	3,18	10,29	4,27	3,81	21,8	7,65	167
9,65	4,78	3,96	10,29	4,27	4,60	21,8	9,55	208
10,20	5,08	3,96	10,80	4,57	4,60	23,1	10,0	232
11,20	6,35	3,96	11,90	5,84	4,60	26,9	9,48	255
12,70	7,62	4,75	13,46	6,99	5,51	31,2	11,9	372
16,60	10,20	6,35	17,40	9,53	7,11	41,3	20,1	828
17,30	9,65	6,35	18,10	9,00	7,11	41,2	24,0	988
20,30	12,70	6,35	21,10	12,07	7,11	50,9	23,7	1 210
22,90	14,00	7,62	23,70	13,30	8,40	56,8	33,4	1 900
23,60	14,40	8,89	24,30	13,70	9,70	58,5	40,4	2 360
26,90	14,70	11,20	27,70	14,10	12,00	63,4	67,6	4 290
33,00	19,90	10,70	33,83	19,30	11,50	81,4	69,0	5 620
34,30	23,40	8,89	35,20	22,60	9,83	89,5	47,3	4 240
35,80	22,40	10,50	36,70	21,50	11,40	89,8	69,1	6 210
39,90	24,10	14,50	40,77	23,30	15,40	98,5	113	11 100
46,70	24,10	18,00	47,63	23,30	19,00	107	201	21 600
46,70	28,70	15,20	47,63	27,88	16,20	116	135	15 600
50,80	31,80	13,50	51,80	30,80	14,40	127	126	16 000
57,20	26,40	15,20	58,00	25,60	16,20	125	231	28 900
57,20	35,60	14,00	58,00	34,70	14,90	143	148	21 200
62,00	32,60	25,00	63,10	31,37	26,27	144	364	52 300
68,00	36,00	20,00	69,40	34,70	21,40	158	316	49 900
74,10	45,30	35,00	75,20	44,07	36,27	184	499	91 700
77,80	49,20	12,70	78,90	48,00	13,97	196	176	34 500
77,80	49,20	15,90	78,90	48,00	17,20	196	222	43 400
101,60	57,20	13,60	103,10	55,75	14,90	243	292	70 900
101,60	57,20	16,50	103,10	55,75	17,80	243	356	86 500
132,50	78,60	20,30	134,20	77,00	21,70	324	530	172 000

Uncoated dimensions			Coated limit dimensions			$l_e$	$A_g^a$	$V_e$
$A$ mm	$B$ mm	$C$ mm	$A'$ mm	$B'$ mm	$C'$ mm			
132,50	78,60	25,40	134,20	77,00	26,80	324	668	217 000
152,40	81,28	20,32	153,90	79,65	21,72	355	700	249 000
152,40	81,28	25,40	153,90	79,65	26,80	355	881	313 000
165,00	88,90	25,40	167,20	86,90	27,30	387	941	364 000
165,10	102,40	31,75	166,50	101,00	33,15	412	969	400 000

NOTE The amount of edge radius ( $r_0$ ) that is assumed when calculating  $A_g$  varies by core size and varies from vendor to vendor. The usual case is to pick the same radius value for all four corners, so that the area loss to be subtracted is  $(4 - \pi)r_0^2$ . Usually ignored are that (1) top and bottom radii can be different from each other; (2) side walls can have slight taper from top to bottom to facilitate pressing; (3) top and bottom surfaces can be convex or concave rather than completely flat.

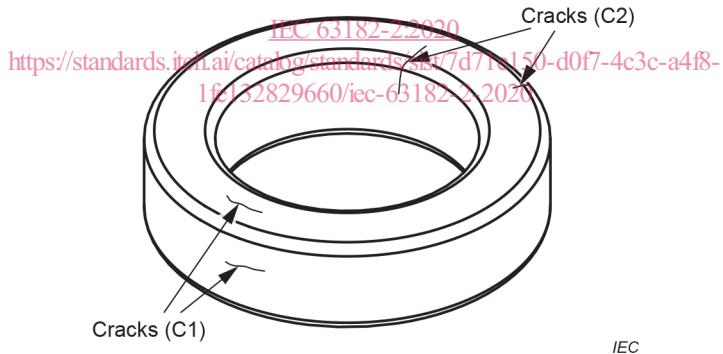
<sup>a</sup>  $A_g$  is the geometric cross-sectional area.

## 5 Limits of surface irregularities

### 5.1 Cracks

The limits of cracks of uncoated cores are as follows (see Figure 3):

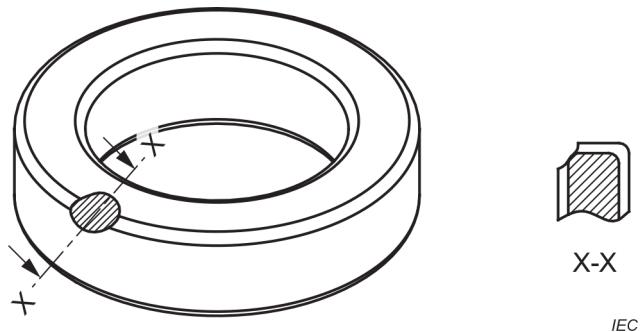
- cracks (C1) approximately parallel to the magnetic flux path are acceptable;
- cracks (C2) approximately perpendicular to the magnetic flux path are not acceptable.



**Figure 3 – Cracks**

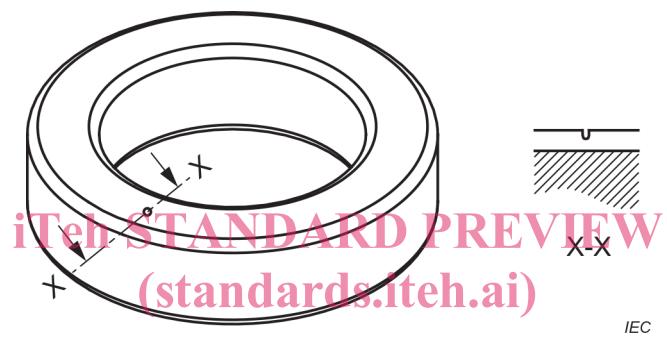
### 5.2 Peeling

Peeling (see Figure 4) is unacceptable at any location. This means that any bare spots that are free from coating caused by peeling or paint chips are unacceptable.

**Figure 4 – Peeling**

### 5.3 Pinholes

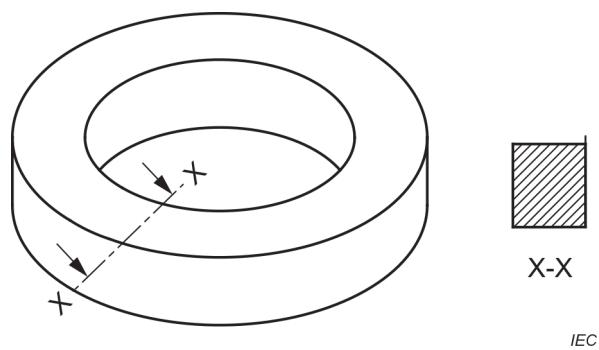
Pinholes (see Figure 5) other than those that expose the bare core surface are acceptable.



[IEC 63182-2:2020  
Figure 5 – Pinholes  
https://standards.iteh.ai/callout/standard/150-d0f7-4c3c-a4f8-1fe132829660/iec-63182-2-2020](https://standards.iteh.ai/callout/standard/150-d0f7-4c3c-a4f8-1fe132829660/iec-63182-2-2020)

### 5.4 Sharp chamfered edge

Any edge that is not sufficiently rounded to prevent damage to the insulation of the magnet wire that is applied, or an edge that is incompletely rounded, or the appearance of flash on an edge, is not acceptable (see Figure 6).

**Figure 6 – Sharp chamfered edge**