

JIS

JAPANESE INDUSTRIAL STANDARD

Pot-cores made of ferromagnetic oxide

JIS C 2516—1990

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Pot-cores made of ferromagnetic oxide

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1. Scope

This Japanese Industrial Standard specifies PP type, RM type and EP type pot-cores made of ferromagnetic oxide which are mainly used for coils and transformers (hereafter referred to as "cores").

Remarks 1. Applicable Standards are given below.

JIS C 2560-General Rules for Ferrite Cores.

JIS G 3101-Rolled Steel for General Structure

2. Corresponding International Standards are given below.

IEC 133 (1985)-Dimensions of pot-cores made of magnetic oxides and associated parts.

IEC 205 (1966)-Calculation of the effective parameters of magnetic piece parts.

IEC 431 (1983)-Dimensions of square cores (RM-cores) made of magnetic oxides and associated parts.

2. Definitions

For the purpose of this Standard, in addition to the definitions of JIS C 2560, the following principal definitions shall apply:

- (1) effective cross-sectional area A_e The effective cross-sectional area of a magnetic path. Square meter (m^2) is used as the unit.
- (2) effective magnetic path length l_e The effective length of a magnetic path. Meter (m) is used as the unit.
- (3) effective volume V_e The effective volume of a magnetic path. Cubic meter (m^3) is used as the unit.
- (4) core constant C_1 or C_2 The constant of a core depending upon its structure and dimensions. Per meter (m^{-1}) is used as the unit of C_1 and per cubic meter (m^{-3}) is used as the unit of C_2 .
- (5) inductance factor A_L The self inductance produced per unit turn of a coil wound around one pair of cores. Henry (H) is used as the unit.
- (6) hysteresis material constant η_B The constant which represents the hysteresis loss of a magnetic material working in Rayleigh region. Per tesla (T^{-1}) is used as the unit.

3. Type Designation

3.1 Structure of Type Designation The type designation shall be structured as shown in the following arrangement:

(1) PP-core

Symbol denoting shape (3.2.1)	Symbol denoting dimension d_1 (3.2.2)	x	Symbol denoting height h_1 (3.2.2)	Hy- phen	Symbol denoting wire slot (3.2.3)	Hy- phen
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Example 1. PP 9 x 5 - 2 -

Example 2. PP 14 x 8 - 4 -

Symbol denoting construc- tion of centerpost (3.2.4)	Hy- phen	Symbol denoting inductance factor (3.2.6)	Hy- phen	Symbol denoting material (3.2.7)
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100 - XY10

J - 100 - XY10

(2) RM-core

Symbol denoting shape (3.2.1)	Symbol denoting number of mounting lattices (3.2.5)	Hy- phen	Symbol denoting construc- tion of center- post (3.2.4)	Symbol denoting induct- ance factor (3.2.6)	Hy- phen	Symbol denoting material (3.2.7)
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Example 1. RM 4 - 100 - XY10

Example 2. RM 6-R - J 100 - XY10

Remark: In the shape RM, the symbol R or S is suffixed with hyphen to the number of mounting lattices according to angle of cut-outs.

(3) EP-Core

Symbol denoting shape (3.2.1)	Symbol denoting height h_1 (3.2.2)	Hy- phen	Symbol denoting inductance factor (3.2.6)	Hy- phen	Symbol denoting material (3.2.7)
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Example EP 7 - 100 - XY10

3.2 Symbols

3.2.1 Shape The symbols denoting the shape shall be as given in Table 1.

Table 1. Style of Core

Symbol	Style	Remarks
PP	Cores of round pot	See Table 5
RM	Cores of square pot	See Table 6
EP	Cores of rectangular pot with deviated centerpost	See Table 9

3.2.2 Dimensions Symbols denoting dimensions are specified in Fig. 2., Fig. 3 and Table 9, and their dimensions are specified in Table 5 to Table 9.

3.2.3 Lead Groove The symbol denoting lead groove shall consist of the number of lead grooves.

3.2.4 Construction of Centerpost When there is no center hole on center limb, such a case shall be denoted by an English capital letter J.

3.2.5 Number of Mounting Lattices The symbol denoting number of mounting lattices shall be such that a number is calculated from the maximum value of dimension a specified in Table 6 by means of the formula below and the number so calculated is raised to an integer.

$$\text{Number of mounting lattices} = a_{\max} \times \frac{10}{25.4}$$

3.2.6 Inductance Factor The symbol denoting inductance factor shall consist of a number in the unit of nanohenry (nH). However, it may be expressed by a symbol agreed upon between the parties concerned with acceptance, in the case of a core which has no air gap on the center limb.

3.2.7 Material The symbol denoting material is subjected to agreement between the parties concerned with acceptance.

4. Quality

4.1 Electrical Characteristics and Magnetical Characteristics The electrical characteristics and magnetical characteristics shall satisfy the requirements prescribed below when the tests are carried out as specified in 5.1 to 5.8.

- (1) Inductance Factor The inductance factor shall be as agreed upon between the parties concerned with acceptance.

The inductance factor of a core having an air gap at its center limb shall be chosen from the numerical values given in Table 2.

Table 2. Inductance Factor

Unit: nH						
16	20	25	40	63	80	100
160	200	250	315	400	500	630
800	1000	1250	1600	2000	2500	

- (2) Effective Q The effective Q shall be as agreed upon between the parties concerned with acceptance.
- (3) Relative Loss Factor The relative loss factor shall be as agreed upon between the parties concerned with acceptance.
- (4) Hysteresis Material Constant The hysteresis material constant shall be as agreed upon between the parties concerned with acceptance.
- (5) D.C. Superimposed Inductance The d.c. superimposed inductance shall be as agreed upon between the parties concerned with acceptance.
- (6) Temperature Coefficient of Effective Permeability The temperature coefficient of effective permeability shall be as agreed upon between the parties concerned with acceptance.
- (7) Disaccommodation Factor The disaccommodation factor shall be as agreed upon between the parties concerned with acceptance.

4.2 Mechanical Characteristics The mechanical characteristics shall satisfy the agreement between the parties concerned with acceptance, when the test of 5.9 is carried out.

4.3 Appearance When the appearance is visually checked, the chip, crack and roughness on surface shall satisfy the items (1) to (3).

- (1) Chip On the mating surface⁽¹⁾, if there is a chip the area of chip shall not exceed 2 % of the area of the mating surface, and if there are plural chips the total area of the chips shall not exceed 4 % of the area of the mating surface. On surfaces other than the mating surface, if there is a chip, the area shall not exceed 3 % of the area of the mating surface, and if there are plural chips, the total area of chips shall not exceed 6 % of the mating surface.

Note (1) The mating surface means the surface where two cores are directly in contact or facing each other with a gap.

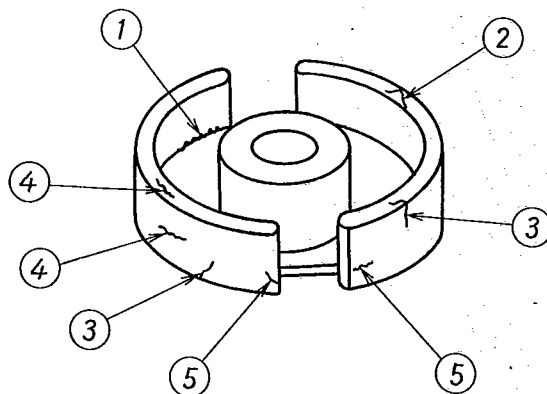
Remark: When a chip is spreading on two surfaces, decision shall be made separately on each surface.

(2) Crack

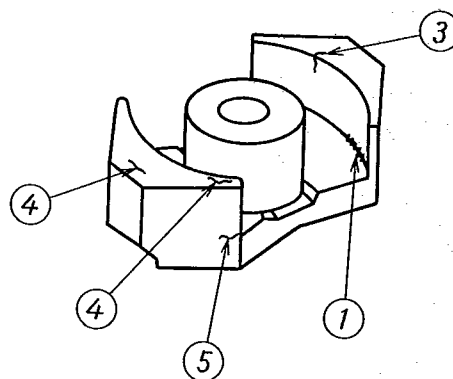
- (a) Cracks on PP-cores and RM-cores shall be such that if the crack appears at one position it shall be as specified in Table 3 according to the position of crack, and if cracks appear at plural positions the total length of cracks shall not exceed twice the length specified in Table 3.

Table 3. Cracks on PP-Core and RM-Core

PP-Core



RM-Core

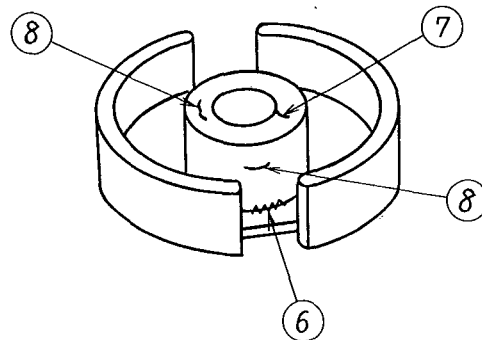


Position of crack	Kind of crack		Length of crack ⁽²⁾
Outer wall part	Back crack of outer wall	①	Not more than $\frac{1}{10}$ of the length of mating of outer wall and bottom
	Ridge shape crack of outer wall	②	Not more than $\frac{1}{2}$ of the minimum wall thickness of outer wall
	Vertical crack on outer wall	③	
	Circumferential crack on outer wall	④	Not more than wall thickness of outer wall
	Crack on outer wall at wire slot	⑤	

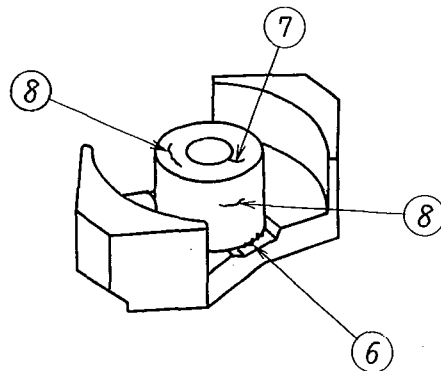
Note (2). The length of crack means the length along a surface. If a crack is spreading on two surfaces, the crack is decided separately on each surface.

Table 3. (Continued)

PP-Core



RM-Core



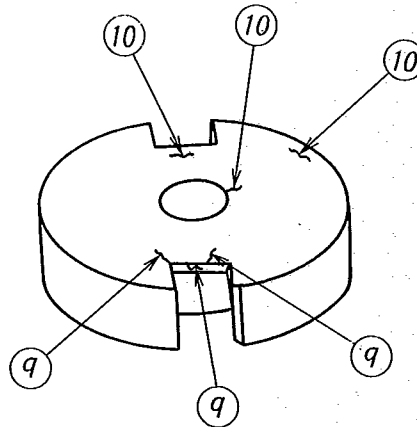
Position of crack	Kind of crack		Length of crack ⁽²⁾
Centerpost	Back crack of centerpost	⑥	Not more than $\frac{1}{10}$ of circumferential length
	Crack appearing on circumference or outer surface of centerpost	⑦	Not more than $\frac{1}{2}$ of wall thickness of centerpost ⁽³⁾
	Circumferential crack on centerpost	⑧	

Note ⁽²⁾ The length of crack means the length along a surface. If a crack is spreading on two surfaces, the crack is decided separately on each surface.

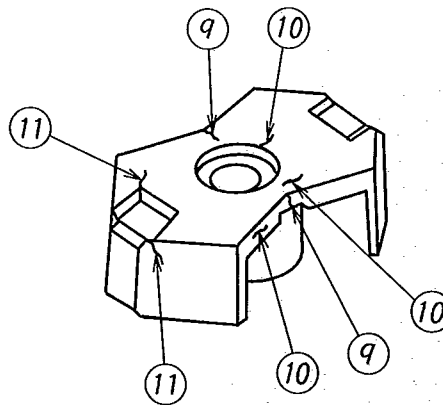
⁽³⁾ For a shape without center hole, this shall be not more than $\frac{1}{5}$ of centerpost diameter.

Table 3. (Continued)

PP-Core



RM-Core

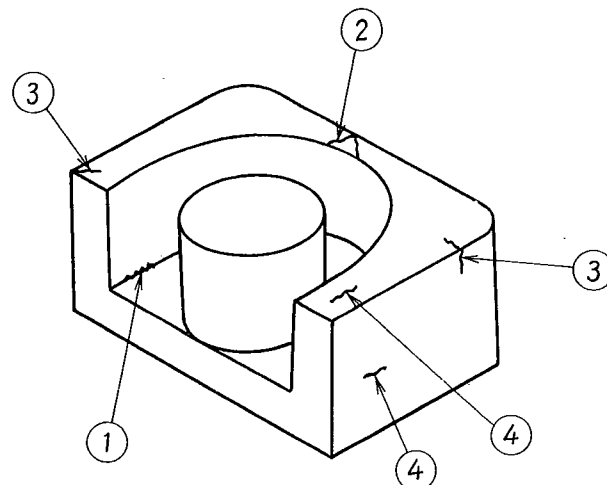


Position of crack	Kind of crack		Length of crack ⁽²⁾
Bottom	Crack on bottom at wire slot	⑨	Not more than $\frac{1}{2}$ of back wall thickness
	Crack on bottom	⑩	Not more than back wall thickness
	Crack starting from clip recess	⑪	Not more than $\frac{1}{5}$ of back wall thickness

Note (2) The length of crack means the length along a surface. If a crack is spreading on two surfaces, the crack is decided separately on each surface.

- (b) Cracks on EP-cores shall be such that if the crack appears at one position it shall be as specified in Table 4 according to the position of crack, and if cracks appear at plural positions the total length of cracks shall not exceed twice the length specified in Table 4.

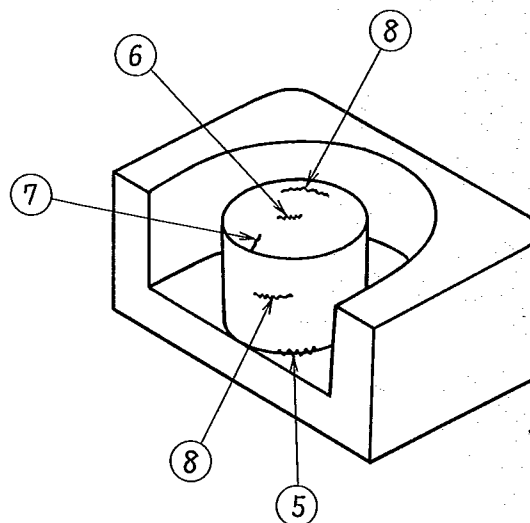
Table 4. Crack of EP-Core



Position of crack	Kind of crack		Length of crack ⁽²⁾
Outer wall part	Back crack of outer wall	①	Not more than $\frac{1}{10}$ of the length of mating of outer wall and bottom
	Ridge shape crack of outer wall	②	Not more than $\frac{1}{2}$ of the minimum wall thickness of outer wall
	Vertical crack on outer wall	③	
	Circumferential crack on outer wall	④	Not more than wall thickness of outer wall

Note (2) The length of crack means the length along a surface. If a crack is spreading on two surfaces, the crack is decided separately on each surface.

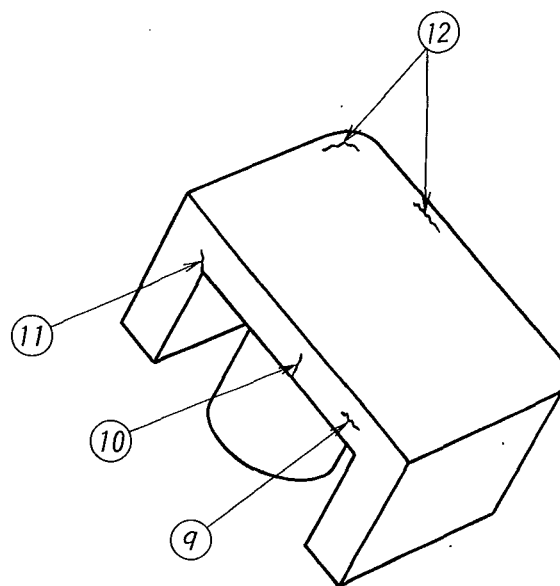
Table 4. (Continued)



Position of crack	Kind of crack		Length of crack ⁽²⁾
Center-post	Back crack of centerpost	⑤	Not more than $\frac{1}{10}$ of circumferential length
	Crack on middle part of centerpost	⑥	Not more than $\frac{1}{5}$ of wall thickness of centerpost
	Crack appearing on outer surface of centerpost	⑦	
	Circumferential crack on centerpost	⑧	

Note (2) The length of crack means the length along a surface. If a crack is spreading on two surfaces, the crack is decided separately on each surface.

Table 4. (Continued)



Position of crack	Kind of crack		Length of crack ⁽²⁾
Bottom	Parallel crack on bottom plate	(9)	Not more than back wall thickness
	Perpendicular crack on bottom bottom plate	(10)	Not more than $\frac{1}{2}$ of back wall thickness
	Crack on joint of ring and bottom plate	(11)	
	Crack on back of bottom plate at periphery	(12)	Not more than back wall thickness

Note (2). The length of crack means the length along a surface. If a crack is spreading on two surfaces, the crack is decided separately on each surface.