

Specification for

Silicon-iron strip-wound cores for use in transformers and inductors for telecommunications and electronic equipment

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Sheet Makers' Conference	United Kingdom Atomic Energy Authority

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Foreword

This British Standard, which has been prepared under the authority of the Telecommunication Industry Standards Committee, specifies the physical, mechanical, magnetic and electrical characteristics of strip-wound cores manufactured from cold-reduced grain-oriented silicon-iron alloy strip. Such cores are used in single- and three-phase transformers and inductors for telecommunications and other electronic equipment employing similar techniques.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies strip-wound cores in both single- and three-phase forms of construction having rectangular cross-sections and rectangular windows (coil spaces). They are manufactured from cold-reduced grain-oriented silicon-iron alloy strip, 0.10 mm and 0.28 mm to 0.35 mm thick and are for use in transformers and inductors for telecommunications and electronic equipment.

2 References

The titles of the British Standards referred to in this standard are listed on the inside back cover.

3 Definitions

For the purposes of this British Standard the following terms and their definitions apply, in addition to those given in BS 4727-1:Group 07.

3.1

strip-wound core

a core, for use in transformers, inductors and similar devices, made by winding a strip of ferromagnetic material on a mandrel. The core is then formed, stress relieved, bonded and cut into two pieces

3.2

rectangular core

a single-phase core wound on a rectangular mandrel, cut to form two C-shaped pieces

NOTE The term C-core is in common and international use for a cut rectangular core. To avoid confusion it should be emphasized that a C-core consists of two C-shaped parts.

3.3

three-phase rectangular core

a core consisting of two single-phase cores placed side-by-side and a third core, having the same build up and strip width as these, wound around them. The resulting assembly has three limbs of equal cross section and two equal winding spaces. The core is then cut to form two E-shaped pieces

NOTE The term E-core is in common and international use for a cut three-phase rectangular core. To avoid confusion it should be emphasized that an E-core consists of two E-shaped parts.

3.4

pattern

a unique combination of dimensions and material thickness

NOTE Details are given in 4.4 and 4.5. Pattern references are of the form Q8.3W where Q refers to a shape, 8.3 to a size within that shape, and W to a thickness of material (see 4.1).

4 Physical and mechanical characteristics

4.1 Material thickness. Each core shall be manufactured from grain-oriented silicon-iron material having a nominal thickness of either 0.10 mm or 0.30 mm. The code letters and code colours which represent these alternatives are specified in Table 1 (see also 10.2).

Table 1 — Colour code for thickness of material

Code letter	Code colour	Nominal strip thickness
		mm
W	White	0.30
X	Green	0.10

4.2 Grades. Cores made from material of nominal thickness 0.30 mm are available in three grades. Grades R and Y are similar, except that R has a special surface finish which leads to lower reactive power for the gap. Grade T cores are produced to wider dimensional tolerances than grade Y. As a consequence they may have less effective core area, and higher losses.

The code letters and code colours which represent these alternatives are specified in Table 2 (see also 10.2).

**Table 2 — Colour code for grade
of material**

Grade	Colour code
T	—
Y	Yellow
R	Red

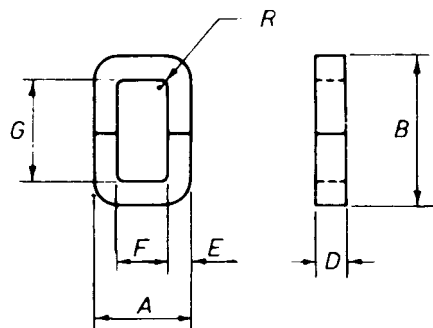
4.3 Environmental category. Each core shall be capable of operating over the temperature range between -55°C and $+155^{\circ}\text{C}$.

Climatic protection is the responsibility of the user and damp heat categories are inapplicable.

4.4 Dimensions of single-phase cores. The dimensions of single-phase cores shall be as specified in Table 3 for each pattern.

Table 3 — Dimensions of single-phase cores

All dimensions are in millimetres.

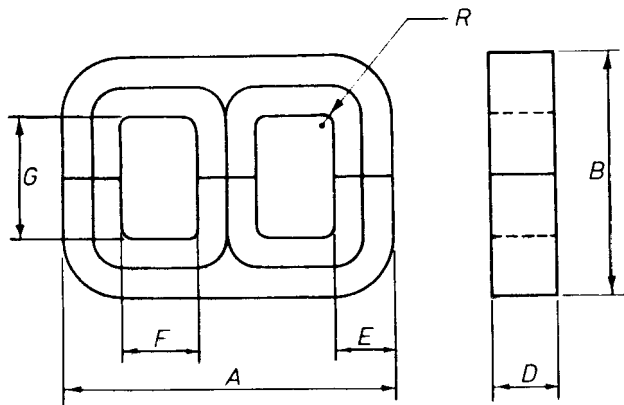


Pattern	A	B	D		E			F	G	R
	max.	max.	min.	max.	min. ^a	min. ^b	max.	min.	min.	max.
Q1.1 ^c	21.03	29.37	6.35	7.14	6.35	5.95	7.14	6.35	14.29	0.79
Q2.1 ^c	25.80	35.72	7.94	8.73	7.94	7.54	8.73	7.94	17.46	
Q3.1	30.56	43.66	9.52	10.32	9.52	9.12	10.32	9.52	22.22	
Q4.1	32.15	50.01	9.52	10.32	9.52	9.12	10.32	11.11	28.58	
Q5.1	30.56	56.36	12.70	13.49	7.94	7.54	8.73	12.70	38.10	1.59
Q5.2			19.05	19.84						
Q5.3			25.40	26.19						
Q5.4			38.10	38.89						
Q6.1	36.91	73.02	12.70	13.49	9.52	9.12	10.32	15.88	50.80	1.59
Q6.2			19.05	19.84						
Q6.3			25.40	26.19						
Q6.4			31.75	32.54						
Q7.1	40.08	79.38	19.05	19.84	9.52	9.12	10.32	19.05	57.15	3.18
Q7.2			25.40	26.19						
Q7.3			31.75	32.54						
Q7.4			38.10	38.89						
Q8.1	49.61	92.08	22.22	23.02	12.70	12.30	13.49	22.22	63.50	3.18
Q8.2			28.58	29.37						
Q8.3			38.10	38.89						
Q8.4			50.80	51.59						
Q9.1	62.31	111.12	19.05	19.84	15.88	15.48	16.67	28.58	76.20	3.18
Q9.2			28.58	29.37						
Q9.3			38.10	38.89						
Q9.4			50.80	51.59						
Q10.1	75.01	130.18	25.40	26.19	19.05	18.65	19.84	34.92	88.90	3.18
Q10.2			38.10	38.89						
Q10.3			50.80	51.59						
Q10.4			69.85	71.44						
Q11.1	97.23	169.86	31.75	32.54	25.40	25.00	26.19	44.45	114.30	3.18
Q11.2			50.80	51.59						
^a Not applicable to Grade T										
^b Grade T only										
^c Available only in 0.10 mm strip thickness										

4.5 Dimensions of three-phase cores. The dimensions of three-phase cores shall be as specified in Table 4 for each pattern.

Table 4 — Dimensions of three-phase cores

All dimensions are in millimetres.



Pattern	A max.	B max.	D		E		F min.	G min.	R max.
			min.	max.	min.	max.			
3Q00	60.33	50.80	12.70	13.50	9.60	10.40	14.30	28.60	1.59
3Q0	73.03	60.33	19.00	19.80	12.70	13.50	15.80	31.70	1.59
3Q1	79.38	67.47	25.40	26.19	12.70	13.49	19.05	38.10	1.59
3Q2	92.08	80.17	25.40	26.19	15.88	16.67	20.64	44.45	1.59
3Q3	95.25	86.52	28.58	29.37	15.88	16.67	22.22	50.80	1.59
3Q4	111.12	99.22	31.75	32.54	19.05	19.84	25.40	57.15	3.18
3Q5	127.00	111.92	31.75	32.54	22.22	23.02	28.58	63.50	3.18
3Q6	149.22	130.97	31.75	32.54	25.40	26.19	34.92	76.20	3.18
3Q7	174.62	156.37	31.75	32.54	31.75	32.54	38.10	88.90	3.18
3Q8	206.38	176.21	38.10	38.89	38.10	38.89	44.45	95.25	3.18
3Q9	222.25	195.26	41.28	42.07	41.28	42.07	47.62	107.95	3.18
3Q10	254.00	220.66	47.62	48.42	47.62	48.42	53.98	120.65	3.18
3Q11	285.75	239.71	53.98	55.56	53.98	55.56	60.32	127.00	3.18
3Q12	323.85	265.11	60.32	61.91	60.32	61.91	69.85	139.70	3.18

5 Magnetic and electrical characteristics

The magnetic and electrical characteristics of single-phase and three-phase cores are given in 5.1 and 5.2 respectively.

5.1 Characteristics of single-phase cores. Values are given (for information) in Table 5(a) and Table 5(b) of the effective magnetic characteristics L_{FE} (path length) and A_{FE} (cross-sectional area). Values are specified in Table 5(a) and Table 5(b) for the electrical characteristics V_2^* (r.m.s. voltage per turn), P_L (power loss) and S (total apparent power). When tested in accordance with 9.2 and 9.4 at the specified level of V_2^* , the values of P_L and S shall not exceed those specified for the appropriate pattern.