BS EN 62317-13:2015

BSI Standards Publication

Ferrite cores — Dimensions

Part 13: PQ-cores for use in power supply applications

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National foreword

This British Standard is the UK implementation of EN 62317-13:2015. It is identical to IEC 62317-13:2015. It supersedes BS EN 62317-13:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/51, Transformers, inductors, magnetic components and ferrite materials.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

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Noyaux ferrites - Dimensions - Partie 13: Noyaux PQ utilisés dans des applications d'alimentation électrique (IEC 62317-13:2015)

Ferritkerne - Maße - Teil 13: PQ-Kerne für den Einsatz in Netzteilen (IEC 62317-13:2015)

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European foreword

The text of document 51/1095/FDIS, future edition 2 of IEC 62317-13, prepared by IEC/TC 51 "Magnetic components and ferrite materials" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62317-13:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-06-24
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-09-24

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60205:2006	NOTE	Harmonized as EN 60205:2006 (not modified).
IEC 62317-1	NOTE	Harmonized as EN 62317-1.

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FERRITE CORES – DIMENSIONS –

Part 13: PQ-cores for use in power supply applications

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International Standard IEC 62317-13 has been prepared by technical committee 51: Magnetic components and ferrite materials.

This second edition cancels and replaces the first edition published in 2008. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of three core sizes (PQ 65/54, PQ 78/39 and PQ 107/87) in Table 1,
b) addition of effective parameter and A_{min} values, of main dimensions of coil formers and of gauge dimensions for PQ-cores for PQ 65/54, PQ 78/39 and PQ 107/87.

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

FDIS	Report on voting
51/1095/FDIS	51/1104/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

FERRITE CORES – DIMENSIONS –

Part 13: PQ-cores for use in power supply applications

1 Scope

This part of IEC 62317 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of PQ-cores and low-profile PQI-cores made of ferrite, and the locations of their terminal pins on a 2,54 mm printed wiring grid in relation to the base outlines of the cores.

The selection of core sizes for this standard is based on the philosophy of including those sizes which are industrial standards, either by inclusion in a national standard, or by broad-based use in industry.

NOTE See IEC 62317-1 for more detail concerning the philosophy of selecting core sizes to be included.

The general considerations that the design of this range of cores is based upon are given in Annex A.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Void.

3 Primary standards

3.1 General

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

3.2 Dimensions of PQ-cores

3.2.1 Principal dimensions

The principal dimensions of PQ-cores shall be as given in Table 1 and those of the low-profile PQ-cores shall be as given in Table 2. See also Figure 1 and Figure 2.

The dimensions of the cores may be checked by means of gauges. By way of example, a possible standard for these gauges is given in Annex B, although no relaxation of the requirements for the dimensions of the cores given in Table 1 and in Table 2 is permitted.

3.2.2 Effective parameter and A_{min} values

The effective parameter values for cores having the dimensions given in 3.2.1 are as shown in Table 3 and Table 4.

3.3 Dimensions limits for coil formers

The essential dimensions of coil formers suitable for use with a pair of PQ-cores shall be as given in Table 5. See also Figure 3.

3.4 Pin locations and base outlines

These shall be as shown in Figure 4.

3.5 Pin diameter

Coil former terminations (pins) shall be accepted by a gauge having 1,2 mm holes on a true position.

4 Mounting

Due to their sizes and respective weights, it is recommended that the cores above PQ 35/35 (including PQ 35/35) be fixed on the printed board with mounting assemblies at two opposite sides of their coil formers.

Concerning low-profile PQ-cores, no mounting assemblies are defined. It is recommended that the two cores be fixed by glue or adhesive tape.

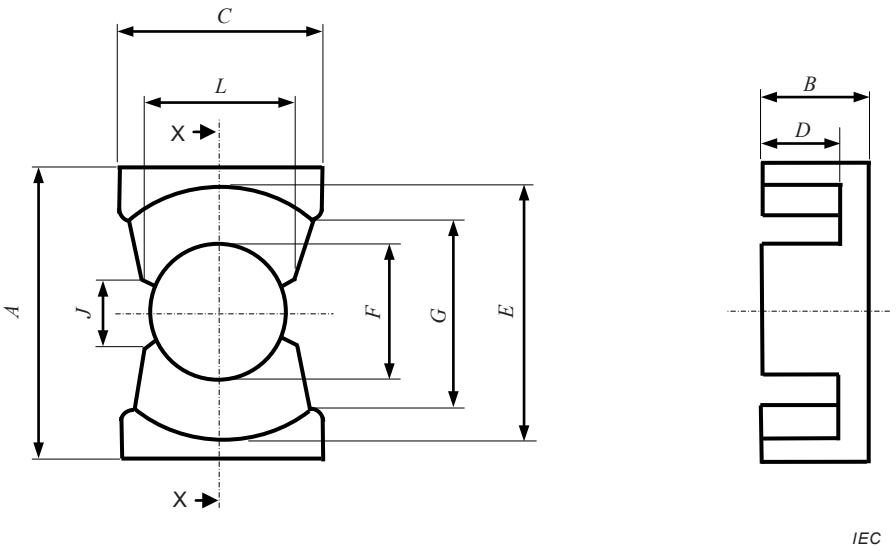

Figure 1 – Dimensions of PQ-cores

Table 1 – Dimensions of PQ-cores

Size		*A* mm	*B* mm	*C* mm	*D* mm	*E* mm	*F* mm	*G* mm	*J* mm	*L* mm
	Min.	20,10	8,00	13,60	5,.00	17,60	8,60	12,00		
PQ 20/16	Nom.								4,80	10,50
	Max.	20,90	8,20	14,40	5,30	18,40	9,00	13,00		
	Min.	20,10	10,00	13,60	7,00	17,60	8,60	12,00		
PQ 20/20	Nom.								4,80	10,50
	Max.	20,90	10,20	14,40	7,30	18,40	9,00	13,00		
	Min.	26,05	9,95	18,55	5,60	22,05	11,80	15,50		
PQ 26/20	Nom.								7,30	13,90
	Max.	26,95	10,20	19,45	5,90	22,95	12,20	16,50		
	Min.	26,05	12,25	18,55	7,90	22,05	11,80	15,50		
PQ 26/25	Nom.								7,30	13,90
	Max.	26,95	12,50	19,45	8,20	22,95	12,20	16,50		
	Min.	31,50	10,15	21,50	5,60	27,00	13,20	19,00		
PQ 32/20	Nom.								6,20	15,10
	Max.	32,50	10,40	22,50	5,90	28,00	13,70	20,00		
	Min.	31,50	15,05	21,50	10,50	27,00	13,20	19,00		
PQ 32/30	Nom.								6,20	15,10
	Max.	32,50	15,30	22,50	10,80	28,00	13,70	20,00		
	Min.	34,50	17,25	25,50	12,35	31,50	14,10	23,50		
PQ 35/35	Nom.								7,30	16,40
	Max.	35,70	17,50	26,50	12,65	32,50	14,60	24,50		
	Min.	39,70	19,75	27,40	14,60	36,40	14,60	28,00		
PQ 40/40	Nom.								7,75	16,80
	Max.	41,30	20,00	28,60	14,90	37,60	15,20	29,00		
	Min.	49,00	24,85	31,50	17,90	43,30	19,65	31,50		
PQ 50/50	Nom.								10,00	22,00
	Max.	51,00	25,10	32,50	18,20	44,70	20,35	32,50		
	Min.	63,70	26,80	39,20	17,75	52,00	25,55	39,20		
PQ 65/54	Nom.								12,00	27,50
	Max.	66,30	27,20	40,80	18,25	54,00	26,45	40,80		
	Min.	77,00	19,45	41,20	12,60	69,10	25,00	60,10		
PQ 78/39	Nom.								13,60	27,60
	Max.	80,00	19,95	42,80	13,20	71,90	26,00	62,50		
	Min.	105,00	43,10	68,50	27,50	93,70	40,20	72,50		
PQ 107/87	Nom.								22,80	43,70
	Max.	109,00	43,90	71,50	28,50	97,30	41,80	75,30		

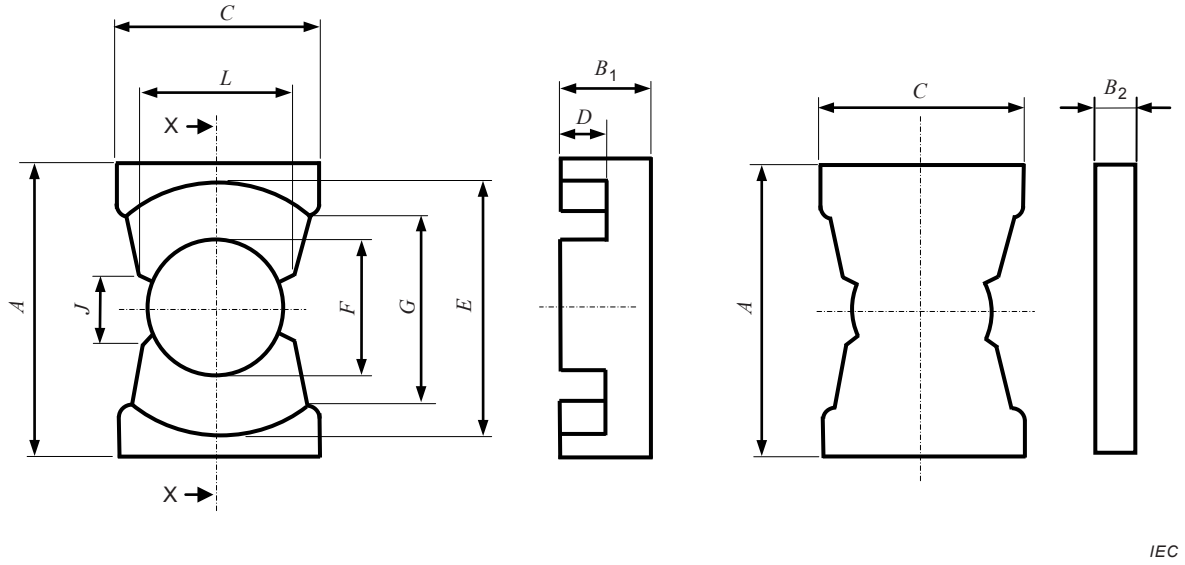

Figure 2 – Dimensions of low-profile PQI-cores

Table 2 – Dimensions of low-profile PQI-cores

Size		*A* mm	B_1 mm	B_2 mm	*C* mm	*D* mm	*E* mm	*F* mm	*G* mm	*J* mm	*L* mm
PQI 16/7,8	Min.	16,10	5,30	2,25	10,90	2,90	14,10	6,80	9,60		
	Nom.									3,90	8,40
	Max.	16,70	5,50	2,45	11,50	3,20	14,70	7,20	10,40		
PQI 20/9	Min.	20,10	5,90	2,85	13,60	2,90	17,60	8,60	12,00		
	Nom.									4,80	10,50
	Max.	20,90	6,10	3,05	14,40	3,20	18,40	9,00	12,50		
PQI 26/12	Min.	26,05	7,20	4,10	18,55	2,95	22,05	11,80	15,50		
	Nom.									7,30	13,90
	Max.	26,95	7,40	4,30	19,45	3,25	22,95	12,20	16,50		

Table 3 – Effective parameter and A_{min} values for PQ-cores

Size	C_1 mm^{-1}	$C_2 \times 10^{-3}$ mm^{-3}	A_e mm^2	l_e mm	V_e mm^3	A_{min} [a] mm^2
PQ 20/16	0,580 53	9,034 6	64,3	37,3	2 400	59,3
PQ 20/20	0,709 95	11,129	63,8	45,3	2 890	59,3
PQ 26/20	0,361 41	2,932 5	123	44,5	5 490	113
PQ 26/25	0,437 83	3,569 9	123	53,7	6 590	113
PQ 32/20	0,313 14	2,001 2	156	49,0	7 670	142
PQ 32/30	0,440 40	2,833 3	155	68,5	10 600	142
PQ 35/35	0,465 38	2,718 8	171	79,7	13 600	161
PQ 40/40	0,491 97	2,602 7	189	93,0	17 600	174
PQ 50/50	0,342 34	1,032 6	332	113	37 600	314
PQ 65/54	0,209 36	0,355 40	589	123	72 700	531
PQ 78/39	0,256 49	0,577 90	444	114	50 500	386
PQ 107/87	0,141 35	0,098 530	1 430	203	291 000	1 320

[a] See 2.2 of IEC 60205:2006.

Table 4 – Effective parameter and A_{min} values for low-profile PQI-cores

Size	C_1 mm^{-1}	$C_2 \times 10^{-3}$ mm^{-3}	A_e mm^2	l_e mm	V_e mm^3	A_{min} [a] mm^2
PQI 16/7,8	0,466 78	11,185	41,7	19,5	814	37,4
PQI 20/9	0,345 95	5,238 7	66,0	22,8	1 510	59,3
PQI 26/12	0,224 03	1,814 3	123	27,7	3 420	110

[a] See 2.2 of IEC 60205:2006.

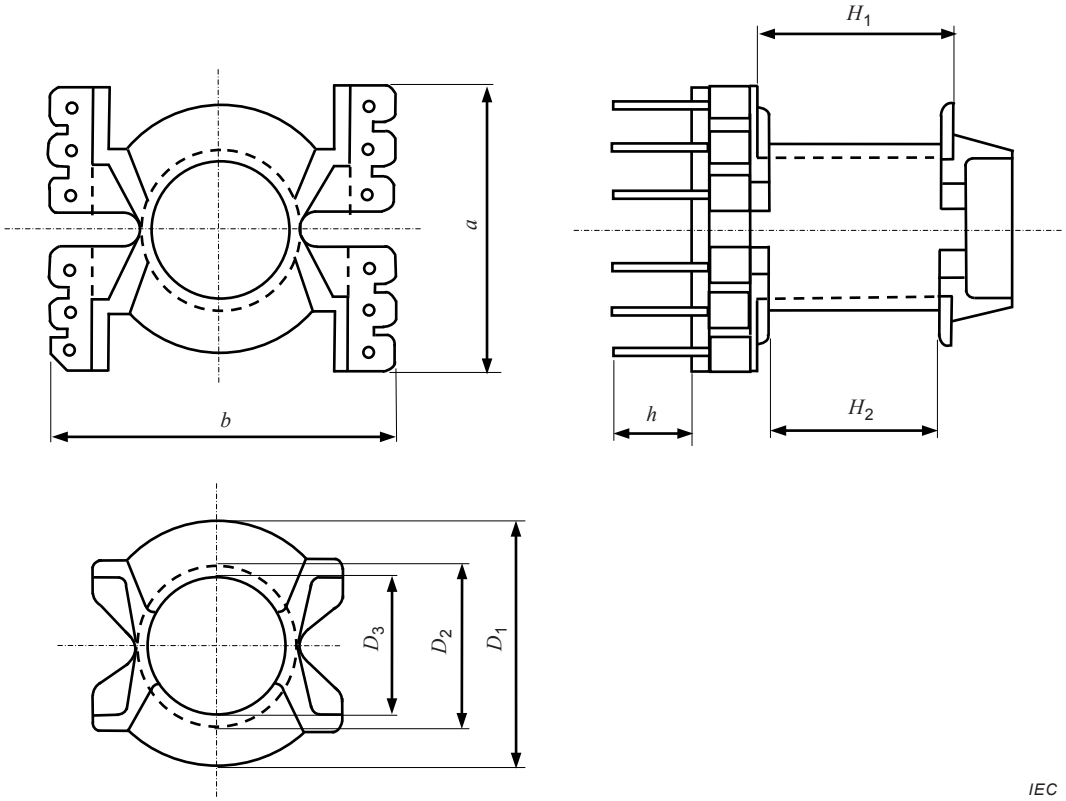

Figure 3 – Main dimensions of coil formers for PQ-cores

Table 5 – Main dimensions of coil formers for PQ-cores

Size	D_1 mm		D_2 mm		D_3 mm		H_1 mm		H_2 mm		a mm	b mm	h mm
	Min.	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Max.**	**Max.**	**Min.**
PQ 20/16	17,05	17,45	10,85	11,05	9,05	9,25	9,60	9,95	8,55	9,20	23,35	23,35	6,1
PQ 20/20	17,05	17,45	10,85	11,05	9,05	9,25	13,60	13,95	12,55	13,20	23,35	23,35	6,1
PQ 26/20	21,35	21,85	14,15	14,45	12,25	12,55	10,80	11,15	9,75	10,40	26,95	29,65	6,1
PQ 26/25	21,35	21,85	14,15	14,45	12,25	12,55	15,40	15,75	14,35	15,00	26,95	29,65	6,1
PQ 32/20	26,35	26,85	15,85	16,15	13,85	14,15	10,80	11,15	9,65	10,30	32,35	34,35	6,6
PQ 32/30	26,35	26,85	15,85	16,15	13,85	14,15	20,35	20,95	19,20	20,10	32,35	34,35	6,6
PQ 35/35	30,85	31,35	16,65	17,05	14,75	15,05	24,05	24,60	22,90	23,95	35,55	39,45	7,1
PQ 40/40	35,75	36,25	17,35	17,65	15,45	15,75	28,55	29,05	27,40	28,20	41,30	42,45	6,1
PQ 50/50	42,65	43,15	22,95	23,45	20,55	21,05	34,75	35,25	33,50	34,30	51,00	51,25	9,6
PQ 65/54	51,35	51,85	29,05	29,55	26,65	27,15	34,45	34,95	33,20	34,00	–	–	–
PQ 78/39	68,45	68,95	28,60	29,10	26,20	26,70	24,15	24,65	22,90	23,70	–	–	–
PQ 107/87	93,05	93,55	44,40	44,90	42,00	42,50	53,95	54,45	52,70	53,50	–	–	–

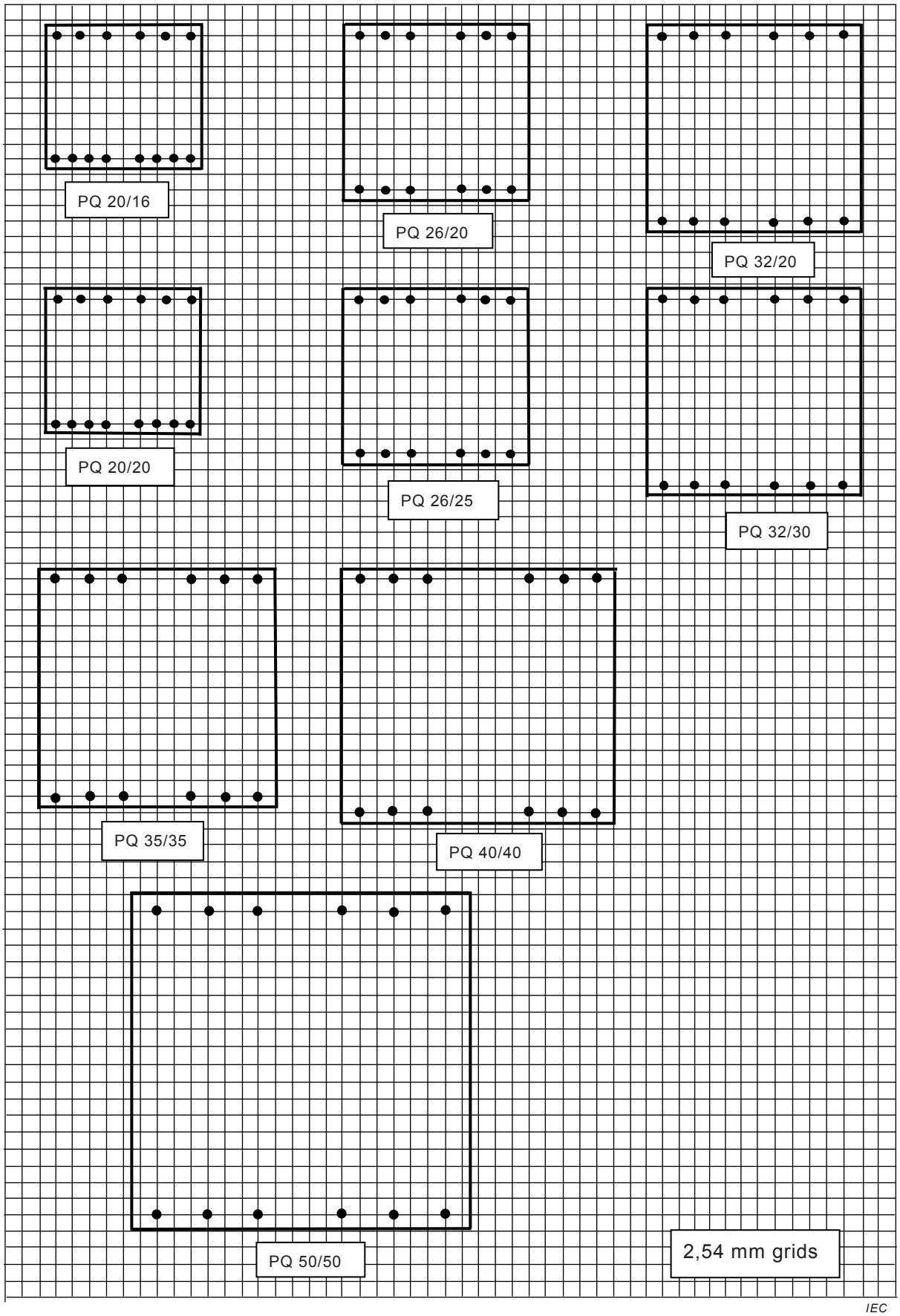

Figure 4 – Pin locations and base outlines viewed from the upper side of the board

Annex A
(informative)

PQ-core design

The design of PQ-cores standardized by the IEC is based on the following considerations:

a) minimize the design "q" ($l_e/A_e \times l_w/A_w$) with a uniform cross-section area of each magnetic path,

   where

   l_w is the average length of turns;

   A_w is the available winding cross-section.

   One useful way to consider ferrite core design is by evaluating the design factor "q". Minimize the "q" results in the highest inductance and lowest copper losses in the transformer or inductor. PQ-core dimensions in this document are based on this type of design philosophy;

b) get more transmission power from the transformer assembly or real estate compared with similar size cores;

c) be able to take out the innermost wire without crossing other wires.

   There are no base plates on the sides of the centre pole area. The innermost wire in the coil can be taken out directly, making it easier to support the specified withstand voltage of transformers;

d) the outside legs cover the coil former more than E-cores;

   PQ-cores cover the coil former by more than 40 %, resulting in a good magnetic shielding effect.

Annex B
(informative)

An example of gauge to check the dimensions of PQ-cores

B.1 General

The gauges shall be in accordance with Figure B.1 and Table B.1.

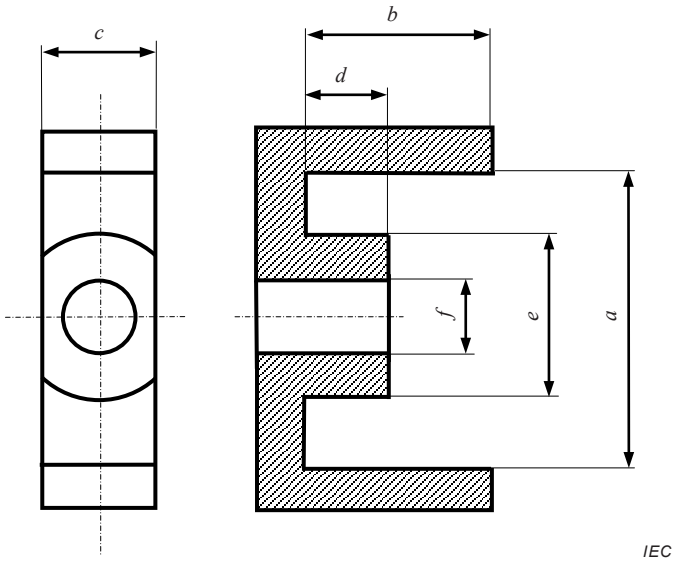

Figure B.1 – Gauge dimensions

Table B.1 – Gauge dimensions

Size	*a*		*b*		*c*		*d*	*e*		*f*	
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Min.	Max.	Min.	Max.
PQ 16	16,705	16,715	7,50	7,60	11,505	11,515	2,90	14,085	14,095	7,205	7,215
PQ 20	20,905	20,915	12,20	12,30	14,405	14,415	2,90	17,585	17,595	9,005	9,015
PQ 26	26,955	26,965	14,50	14,60	19,455	19,465	2,95	22,035	22,045	12,205	12,215
PQ 32	32,505	32,515	17,30	17,40	22,505	22,515	5,60	26,985	26,995	13,705	13,715
PQ 35	35,705	35,715	19,50	19,60	26,505	26,515	12,35	31,485	31,495	14,605	14,615
PQ 40	41,305	41,315	22,00	22,10	28,605	28,615	14,60	36,385	36,395	15,205	15,215
PQ 50	51,005	51,015	27,10	27,20	32,505	32,515	17,90	43,285	43,295	20,355	20,365
PQ 65	66,305	66,315	29,20	29,30	40,805	40,815	17,75	51,985	51,995	26,455	26,465
PQ 78	80,005	80,015	21,95	22,05	42,805	42,815	12,60	69,085	69,095	26,005	26,015
PQ 107	109,005	109,015	45,90	46,00	71,505	71,515	27,50	93,685	93,695	41,805	41,815

B.2 Procedure and requirements

To check the winding space, the gauge shall be fully inserted into the core without forcing; when fully inserted, the gauge shall meet the mating surface of the outer legs of a core under test.

Bibliography

IEC 60205:2006, *Calculation of the effective parameters of magnetic piece parts*

IEC 62317-1, *Ferrite cores – Dimensions – Part 1: General specification*

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