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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 9630-2012

Replacing GB/T 9630-1988

Dimensions of pot-cores made of magnetic oxides and associated parts

磁性氧化物制成的罐形磁心及其附件的尺寸

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1 Scope

The standard lays down, for the preferred series of pot-cores made of magnetic oxides, the important dimensions that bear on mechanical interchangeability, and the limiting dimensions of the coil formers used together with those cores.

Appendix A gives the general principles on which that series of cores was designed.

2 Normative references

One document is cited: GB/T 20874-2007 Calculation of the effective parameters of magnetic piece parts, identical with IEC 60205:2001.

For dated references only the edition cited applies; for undated references the latest edition, including all amendments, applies.

3 Basic requirements

A core shall meet the requirements that follow, so that the mechanical interchangeability of the whole assembly and of the coil former is assured.

3.1.1 Main dimensions

The main dimensions of pot-cores shall comply with the provisions of Table 1 and Table 2. Figure 1 shows the main dimensions of a pot-core without a slot and Figure 2 those of a pot-core with a slot, both as a plan view and as a section X-X; the letters used are the outer diameter, the two intermediate diameters, the centre hole diameter, the overall height, the height of the centre leg, the inner corner radius, the slot depth measured from the outside and the slot width.

Table 1 fixes, in millimetres, the minimum and maximum values of six of those dimensions and the maximum inner corner radius, for twelve core types, and gives for each type the figure that applies. The types covered are P3.3/2.6, P4.6/3.1, P5.8/3.3, P7.4/4.0, P9/5, P11/7, P14/8, P18/11, P22/13, P26/16, P30/19 and P36/22. The table is wide, each dimension being carried by a pair of columns, and its values are not reproduced here.

Five notes follow Table 1. The types P3.3/2.6 and P4.6/3.1 are the cores without a centre hole shown in Figure 1. For the types P9/5 and P11/7, a centre hole dimension of zero means a core without a centre hole. Sharp inner corners of the pot-core are advantageous, but in practice a fillet is allowed provided its radius does not exceed the value fixed in Table 1. The dimensions of these cores may be checked with gauges, and Appendix C gives one workable example of such gauges. In order to make production easier, gauges of dimensions different from those given in Appendix C may be used, but this shall not be a reason for relaxing the requirements on core dimensions laid down in 3.1 of this standard.

Table 2 fixes, in millimetres, the limiting dimensions of the slot width and of the slot depth for cores with two slots, giving a minimum and a maximum for each of the two dimensions across the same twelve core types; for the four smallest types no value of the slot depth measured from the outside is given. Two notes follow it: the table does not fix the shape of the slot, only its width; and if the dimensional tolerance requirement is stricter, it is recommended that one of the two dimensions tend towards its minimum value and the other towards its maximum value.

3.1.2 Lead-out grooves

Where a lead-out groove is cut in the bottom face corresponding to the slot, its minimum depth shall comply with Table 3.

Table 3 has two columns, the core type and the minimum depth of the lead-out groove in millimetres, and covers six types: P14/8, 0.2 mm; P18/11, 0.3 mm; P22/13, 0.4 mm; P26/16, 0.5 mm; P30/19, 0.6 mm; P36/22, 0.6 mm.

3.1.3 Effective parameter values

For pot-cores whose dimensions comply with 3.1.1, the effective parameter values shall

comply with Table 4 and Table 5; the definitions of those parameters and their calculation follow GB/T 20874-2007.

Table 4 gives the effective parameter values for pot-cores with a centre hole and Table 5 for pot-cores without a centre hole. Each table carries six parameter columns, namely the first and second core constants, the effective cross-sectional area, the effective magnetic path length, the effective volume and the minimum cross-sectional area, with the units stated in the column headings. Table 4 covers ten core types from P5.8/3.3 to P36/22 and Table 5 twelve types from P3.3/2.6 to P36/22. The values are not reproduced here. A note to Table 4 states that a manufacturer may list in its own product catalogue parameter values more precise than those of the table.

3.2 Main dimensions of the coil former

The main dimensions of the coil former, shown in Figure 3, shall comply with Table 6. Figure 3 gives the outer flange diameter, the diameter of the bore and the height between the flanges.

A note states that the several dimensions of Table 6 that correspond to dimensions of the same kind in Table 1 are marked with the same letters, but in lower case; the example given is that the coil former bore dimension corresponds to the core dimension 2D of Table 1.

Table 6 has three dimension columns, giving a maximum for the outer flange diameter, a minimum for the bore and a maximum for the height, in millimetres, for the same twelve core types from P3.3/2.6 to P36/22. The values are not reproduced here.

Appendix A Appendix A (informative) Design of pot-cores

The pot-cores covered by the standard were originally designed for optimum dimensions on the basis of minimum loss, expressed as the ratio of the dc resistance to the inductance. Before the performance was optimised, the following ranges of centre hole diameter were chosen: for the P5.8/3.3 core, 0.95 mm to 1.05 mm; for P7.4/4.0, 1.05 mm to 1.15 mm; for P9/5 and P11/7, 2.0 mm to 2.2 mm; for P14/8 and P18/11, 3.0 mm to 3.2 mm; for P22/13, 4.4 mm to 4.7 mm; for P26/16, P30/19 and P36/22, 5.4 mm to 5.7 mm.

At the outset, the 14 mm by 8 mm pot-core with an adjuster diameter of 3 mm was the smallest core that could be mass produced. As electronic equipment became smaller, four smaller types of pot-core, P7.4/4.0, P5.8/3.3, P4.6/3.1 and P3.3/2.6, were brought into the pot-core standard, and the larger pot-core P42/29 was removed from it.

The ratio of diameter to height calculated from these assumptions is listed in Table A.1 and is very nearly a constant: apart from the smallest core, the ratio lies between 1.48 and 1.76. Table A.1 has three value columns, the nominal outer diameter, the nominal overall height and their ratio, for the twelve core types; the individual values are not reproduced here.

The steps of the series are such that the ratio of dc resistance to inductance of two neighbouring pot-cores differs by about 1.6.

Appendix B Appendix B (informative) Derived standards

The basic requirements given in the main text fix the main dimensional values of the core assembly and of the wound coil former, and components that follow the standard are fully interchangeable.

Departments concerned with the manufacture and use of pot-cores may wish to draw up local standards for common use. Such standards are to have dimensions and tolerances more detailed than clause 3 of this standard and are to suit the level of technology of that region; standards of this kind are called derived standards. In drawing up a derived standard, care is to be taken not to exclude any other type of pot-core that conforms to the IEC basic standard and also satisfies a performance specification used in a special case.

It is pointed out that when components conforming to a derived standard meet the requirements of clause 3, and the core assembly and the wound coil former may therefore be interchanged freely, the individual parts are not necessarily interchangeable. A note gives an example: an adjuster intended for use with a core conforming to one derived standard need not, and may not, be usable with a core conforming to another derived standard, because the tolerances on the centre hole in the two derived standards may differ markedly while neither goes outside the range of the basic requirements.

When a national standard is being established, the standardisation bodies concerned are required to state the following in the national standard: that the standard agrees with the dimensional requirements of IEC 60133 and that, in order to promote the practical use of the standard, its content is more detailed than IEC 60133; and that within the framework of the IEC standard other solutions are possible, that cores and formers produced to those solutions are interchangeable with cores and formers produced to this national standard, and that such solutions are not excluded.

Relationship to previous standards Relationship to previous standards

The cover carries the replacement mark for GB/T 9630-1988. The foreword states that the standard replaces GB/T 9630-1988, and that compared with that edition, in view of the trend towards smaller cores and in the light of the actual state of core production and use at home and abroad, four smaller types of pot-core were added and the P42/29 core was deleted; the example of coil former dimensions for pot-cores given in the former Appendix B was deleted; and the requirements on gauge dimensions for the different cores were supplemented.

The foreword states that the standard adopts IEC 60133:2000 identically by the translation