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GB/T 896-2020

Replacing GB/T 896-1986

“E” Rings

开口挡圈

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Foreword

GB/T 896 is one of the “circlips” series of national standards. This series of standards include:

- GB/T 893 Retaining Rings for Bores;
- GB/T 894 Circlips for Shaft;
- GB/T 896 “E” Rings;
- GB/T 959.1 Specifications for Retaining Rings - Circlips.

This Standard was drafted in accordance with the rules in GB/T 1.1-2009.

This Standard serves as a replacement of GB/T 896-1986 “E” Rings. In comparison with GB/T 896-1986, apart from editorial modifications, the main technical changes are as follows:

- The tolerances of the thickness of “E” rings are modified (see Table 1; Table 1 of Version 1986);
- The outer diameter d_3 of “E” rings after assembly is added (see Table 1);
- The outer diameter D in the free state is deleted (see Table 1 of Version 1986);
- The range of the nominal diameter d_2 of “E” rings is modified (see Chapter 1 and Table 1; Chapter 1 and Table 1 of Version 1986);
- The range of shaft diameter for the specifications of “E” rings is modified (see Table 1; Table 1 of Version 1986);
- The inner diameter and its tolerances of “E” rings are modified (see Table 1; Table 1 of Version 1986);
- The standard value of groove carrying capacity F_N is added (see Table 1);
- The standard values of “E” rings carrying capacity F_S and F_{Sg} are added (see Table 1);
- The requirements for flatness are added (see Chapter 8);
- The limit speed of “E” rings is added (see Table 1);
- Appendix A is deleted (see Appendix A of Version 1986).

This Standard was proposed by China Machinery Industry Federation.

“E” Rings

1 Scope

This Standard specifies the codes, types and dimensions, carrying capacity, limit speed, groove design, technical conditions and markings of “E” rings with a nominal diameter of $d_2 = 0.8 \text{ mm} \sim 30 \text{ mm}$ (hereinafter referred to as “E” rings).

This Standard is applicable to “E” rings for fixing components (parts) on the shaft.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 959.1 Specifications for Retaining Rings - Circlips

GB/T 1237 Designation System for Fasteners

3 Codes

The following codes are applicable to this document.

a	radial width of “E” ring opening in the natural state
d_1	shaft diameter
d_2	nominal diameter = groove diameter
d_3	outer diameter of “E” ring installed in the groove
d_4	inner diameter of “E” ring
F_N	groove carrying capacity with material's lower yield strength $R_{eL} = 200 \text{ MPa}$
F_S	carrying capacity of “E” ring in contact with right angle
F_{Sg}	carrying capacity of “E” ring in contact with chamfer
g	part's chamfer size
m	groove width

5 Carrying Capacity

5.1 General Rules

The installation dimensions of “E” ring requires respective calculation of the groove’s carrying capacity F_N and “E” ring’s carrying capacity F_S . Generally speaking, the lower limit parameter is mainly taken as a reference in the design. The carrying capacities (F_N , F_S , F_{Sg}) provided in Table 1 do not include the safety factor of the yield generated under static load or the fatigue fracture under dynamic load. Under static load, the safety factor of resistance to fracture is at least 2 times.

5.2 Groove’s Carrying Capacity F_N

The F_N values provided in Table 1 are applicable to the groove with the material’s lower yield strength $R_{eL} = 200$ MPa, a given edge distance of n and a shaft diameter of d_1 .

When the material’s lower yield strength R'_{eL} deviates from 200 MPa, the carrying capacity F'_N is proportional to the yield strength. The groove’s carrying capacity shall be calculated in accordance with Formula (1):

$$F'_N = F_N \cdot \frac{R'_{eL}}{200} \quad \dots\dots\dots (1)$$

When the shaft diameter d'_1 deviates from d_1 , the groove’s carrying capacity F'_N shall be calculated in accordance with Formula (2):

$$F'_N = F_N \cdot \frac{d'_1 - d_2}{d_1 - d_2} \quad \dots\dots\dots (2)$$

5.3 “E” Ring’s Carrying Capacity F_S

The F_S values provided in Table 1 are applicable to the assembly where the “E” ring is in contact with the part at right angles (see Figure 3).

The F_{Sg} values provided in Table 1 are applicable to the assembly where the “E” ring is in contact with the part with a chamfer size of g (see Figure 4).

F_S values and F_{Sg} values are applicable to the “E” rings with a material elasticity modulus of 210 GPa.

For a different chamfer size g' , the “E” ring’s carrying capacity F'_{Sg} shall be calculated in accordance with Formula (3):

$$F'_{Sg} = F_{Sg} \cdot \frac{g}{g'} \quad \dots\dots\dots (3)$$

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