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Rolling Bearing Parts - Metal Solid Cages - Specifications

滚动轴承零件 金属实体保持架 技术条件

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Rolling Bearing Parts - Metal Solid Cages - Specifications

1 Scope

This Standard specifies the technical requirements for materials, tolerances, appearance quality, as well as inspection methods, inspection rules, markings, packaging, and storage of metal solid cages for rolling bearings.

This Standard is applicable to the production, inspection and acceptance of metal solid cages.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 699-1999 Quality Carbon Structural Steels

GB/T 1176-2013 Casting Copper and Copper Alloys

GB/T 1348-2009 Spheroidal Graphite Iron Castings

GB/T 2828.1-2012 Sampling Procedures for Inspection by Attribute - Part1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-Lot Inspection

GB/T 4437.1-2000 Aluminum and Aluminum Alloy Extruded Tubes - Part 1: Seamless Tubes

GB/T 4437.2-2003 Aluminum and Aluminum Alloy Extruded Tubes – Part 2: Seam Tubes

GB/T 5231-2012 Designation and Chemical Composition of Wrought Copper and Copper Alloys

GB/T 8597-2013 Rolling Bearings - Rust Proof Packaging

$$V_{Kcs}=K_{csmax}-K_{csmin}$$

3.6 Variation of width, V_{Bcs}

The difference between the maximum and minimum single width of the two end faces of the cage.

$$V_{Bcs}= B_{csmax}-B_{csmin}$$

3.7 Flatness, P_k

The difference between the maximum and minimum heights of the plane on one side of the cage at different angular positions along the diametrical direction inside and outside perpendicular to the plane surface.

3.8 Variation of center circle diameter of pocket, V_{Dcp}

The difference between the maximum and the minimum center circle diameters of each pocket on a single cage.

$$V_{Dcp}=D_{cpmax}-D_{cpmin}$$

3.9 Variation of radial distance of center of pocket center of bore, V_{Kp}

The difference between the maximum and the minimum radial distances for the center of each pocket to the center of bore on a single cage.

$$V_{Kp}=K_{pmax}-K_{pmin}$$

3.10 Variation of radial distance of center of pocket to bore surface, V_{Kp1}

The difference between the maximum and the minimum radial distances for the center of each pocket go the bore surface on single cage.

$$V_{Kp1}=K_{p1max}-K_{p1min}$$

3.11 Offset of pocket center line to theory center line, Δ_{P1}

The circumferential offset distance of the actual center line of each pocket to the theory center line of a single radial plane on the radial pocket of a single cage.

$$\Delta_{P1}=P_{1s}-P_1$$

3.12 Variation of chord length between any two adjacent pockets, V_C

The difference between the maximum and the minimum chord lengths for the two

plane.

$$V_e=e_{max}-e_{min}$$

3.20 Deviation of pocket center height, Δ_{K1}

The difference between the pocket center height and the nominal pocket center height.

$$\Delta_{K1}=K_{1s}-K_1$$

4 Symbols (See Figures 1~21)

The symbols given in GB/T 28268-2012 and the following are applicable to this document:

B_c: nominal width of cage: nominal width of cage seat amplitude [see Figures 4~6, Figure 13, Figure 18a), Figure 19a)].

B_{c1}: nominal width of cage seat.

B_{c2}: nominal width of cage cover.

b_c: bar width of cage.

C: the equal chord length of the pocket on the pocket center circle of the cage (hereinafter referred to as chord length).

C_1: the equal chord length of the rivet hole on the rivet hole center circle of the cage.

C_2: the chord length of double-row adjacent pocket.

D_c: nominal outside diameter of cage.

D_{cp}: nominal diameter of the pocket center circle of the cage.

D_{cp1}: nominal diameter of the rivet hole center circle of the cage.

D_{cp2}: nominal diameter of pocket bottom center circle of the cage for spherical roller bearing.

D_w: nominal diameter of rolling element.

d_c: nominal bore diameter of the cage.

d_{c4}: nominal diameter of pocket the of the cage.

d_{c5}: nominal diameter of rivet hole of the cage.

e: thickness between the rivet hole and the adjacent pocket of the cage.

f: perpendicularity of the pocket centerline to the positioning reference end face.

f_1: perpendicularity of rivet hole centerline to the positioning reference end face.

h_c: nominal height from the cage bottom surface the pocket bottom surface (hereinafter referred to as hole bottom height).

K_1: nominal height of pocket center.

K_c: nominal wall thickness of the cage.

K_p: radial distance from pocket center to the bore center.

K_{p1}: radial distance from the pocket center to the bore surface.

L_c: nominal length of pocket of the cage: actually-measured size (see Figures 14~16).

L_{c1}: nominal width of pocket of the cage.

P_k: flatness.

t_1: nominal height of the cage boss (hereinafter referred to as boss height).

t_2: nominal depth of the cage groove (hereinafter referred to as groove depth).

V_{Bcs}: variation of width: variation the cage seat B_c [see Figures 4~6, Figure 13, Figure 18a), Figure 19a)]

V_{bc}: variation of the bar width.

V_C: variation of chord length between any two adjacent pockets.

V_{C1}: variation of chord length between two adjacent rivet holes.

V_{C2}: variation of chord length between double-row adjacent pockets.

V_{Dcmp}: variation of mean outside diameter.

V_{Dcp}: variation of center circle diameter of pocket.

V_{Dcsp}: variation of outside diameter in a single plane.

V_{dcmp}: variation of mean bore diameter.

V_{dcsp}: variation of bore diameter in a single plane.

V_e: variation of thickness between rivet hole and pocket.

with the provisions of the manufacturer or in consultation with the user.

6.5 Others

6.5.1 Non-interchangeable cages with separated structure, for the convenience of assembly, are allowed to be marked on the outer cylindrical surface or inner cylindrical surface of the cage (or typed on the end face).

6.5.2 The cage shall be able to rotate flexibly under the condition of the complete set of bearings. There is no obvious difference in the forward and reverse rotation of the bearing. The self-aligning performance is good. There is no abnormal sound. The ball should not be caught or dropped.

6.5.3 The cage with radial positioning at the stop shall not have a clearance greater than that specified by the manufacturer or the user.

6.5.4 The junction between the cylindrical surface of the pocket bottom plane of the machined solid cage shall be a smooth arc transition and there shall be no acute angle.

6.5.5 The middle of pocket bottom of the machined cage for cylindrical roller bearings and spherical roller bearings may be made into a conical recess with a diameter of no more than 1/2 pocket diameter and a cone angle of no more than 170 °.

6.5.6 After the combination of cage with separated structure, the tolerances shall not exceed the provisions of 6.2.

6.5.7 When the user has dynamic balancing requirements for the cage, it may be determined through consultation with the user.

7 Inspection Method

7.1 Measurement for variations of the bore diameter and outside diameter in a single plane (V_{dcsp}, VD_{csp}), and the variations of mean bore diameter and outside diameter (V_{dcmp}, V_{Dcmp})

The following measurement methods can be adopted:

a) Measure by the two-point method (see Figure 22). Place the tested cage on the platform and position it from the inner (outer) cylindrical surface. The measuring point is 180° with one of the fulcrum points. Measure in any single radial plane at a double chamfer from the end face of the cage; the cage is rotated for more than one revolution; and the difference between the measured maximum value and the minimum value is variations of the bore diameter and outside diameter in a single plane, V_{dcsp} and V_{Dcsp}. Take repeated measurements in several radial planes to calculate the variations of mean bore diameter and outside diameter,

7.22 Measurement for angle between the pocket centerline and centerline of the cage, Θ, for spherical roller bearing

The following measurement methods may be adopted:

a) Measure by universal protractor;

b) Measure by special measuring sample column;

c) Measure by 3-coordinate measuring machine.

7.23 Test of nominal diameter of pocket, d_{c4}, and nominal diameter of rivet hole, d_{c5}

The following test methods may be adopted:

a) Test by the through-or-no-through gauge. The through end can be passed smoothly; while the no-through end shall not exceed 1/3 length of the pocket (rivet hole);

b) The nominal diameter of pocket, d_{c4}, may be measured by the bore diameter meter.

7.24 Measurement for perpendicularity of rivet hole centerline to the positioning reference end face, f_1

Measure by the measuring tool with sufficient accuracy.

7.25 Measurement for surface roughness

Measure by the provisions of JB/T 7051-2006.

8 Inspection Rules

8.1 The appearance quality of the cage shall be inspected for 100%.

8.2 The sampling inspection of the cage shall be as specified in GB/T 2828.1-2012. When using the special inspection Level S-4, the Acceptance Quality Limit (AQL) of the primary inspection items shall be 1.0; while the Acceptance Quality Limit (AQL) of the secondary inspection items shall be 4.0. For the products with special requirements, the sampling scheme and acceptance level shall be determined through the negotiation between the user and the manufacturer. The primary inspection items of various cages can refer to Table 12.

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