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**Rolling Bearings - Flexible Bearings for Harmonic
Drive Gear Reducers of Industrial Robots**

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Rolling Bearings - Flexible Bearings for Harmonic Drive Gear Reducers of Industrial Robots

1 Scope

This Standard specifies the identification code, overall dimensions, technical requirements, inspection and test methods, inspection rules, marking and packaging of flexible bearings for harmonic drive gear reducers of industrial robots (hereinafter referred to as bearings).

This Standard is applicable to the production, inspection and acceptance inspection of bearings.

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 272 *Rolling Bearings - Identification Code*

GB/T 307.1 *Rolling Bearings - Radial Bearings - Geometrical Product Specifications (GPS) and Tolerance Values*

GB/T 307.2 *Rolling Bearings - Measuring and Gauging Principles and Methods*

GB/T 307.3 *Rolling Bearings - General Technical Regulations*

GB/T 308.1 *Rolling Bearings - Balls - Part 1: Steel Balls*

GB/T 4199 *Rolling Bearings - Tolerances - Definitions*

GB/T 4604.1 *Rolling Bearings - Internal Clearance - Part 1: Radial Internal Clearance for Radial Bearings*

GB/T 6930 *Rolling Bearings - Vocabulary*

GB/T 7811 *Rolling Bearings - Symbols for Physical Quantities*

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

GB/T 18254 *High-carbon Chromium Bearing Steel*

GB/T 24605 *Rolling Bearings - Marking for Products*

GB/T 24608 *Inspection Rules for Rolling Bearings and Commercial Parts*

GB/T 25769 *Rolling Bearings - Measuring Methods for Radial Internal Clearance*

GB/T 28268 *Rolling Bearings - Specifications of Pressed Cages*

GB/T 30819 *Harmonic Drive Gear Reducers for Robots*

GB/T 32562 *Rolling Bearings - Measuring Methods for Friction Torque*

GB/T 33624 *Rolling Bearings - Test and Assessment Methods for Cleanliness*

GB/T 34891 *Rolling Bearings - Parts Made from High-carbon Chromium Bearing Steels - Specifications for Heat Treatment*

JB/T 6641 *Rolling Bearings - Residual Magnetism and Its Assessment Method*

JB/T 7048 *Rolling Bearing Parts - Plastic Cage - Specifications*

JB/T 7051 *Rolling Bearing Parts - Methods for the Measurement and Assessment of Surface Roughness*

JB/T 10336 *Rolling Bearings and Parts - Supplementary Specifications*

3 Terms and Definitions

What is defined in GB/T 6930 and GB/T 30819, and the following terms and definitions are applicable to this Standard.

3.1 Flexible Bearings

Flexible bearings refer to bearings whose inner and outer ring have a relatively thin wall thickness, and which are installed on the cam, and can generate corresponding elastic deformation with different cam contour curves during the operation.

3.2 Harmonic Gear Reducers

Harmonic gear reducers refer to a transmission device that utilizes a wave generator to make flexible gears generate controllable elastic deformation waves and implements movement and power transmission through the interaction with the rigid gears.

4 Symbols

What is listed in GB/T 4199 and GB/T 7811, and the following symbols are applicable to this document.

tempered at a high temperature. After quenching and tempering, the hardness difference of the same ring shall satisfy:

--- $D \leq 100$ mm, the hardness difference is not greater than 0.5 HRC;

--- $D > 100$ mm, the hardness difference is not greater than 1.0 HRC.

The residual Austenite content of the rings after the quenching and tempering treatment does not exceed 5%. The rings shall receive dimensional stability treatment. The quality of other thermal treatments shall comply with the stipulations of GB/T 34891.

The steel balls are made of high-grade and high-quality GCr15 steel that complies with the stipulations of GB/T 18254. The other technical requirements shall comply with the stipulations of GB/T 308.1.

7.1.2 Cages

The cages are made of engineering plastics PA66-GF25 or PA66; the raw materials and technical requirements shall comply with the stipulations of JB/T 7048. Or, the cages may also be made of 08 and 10 cold-rolled low-carbon thin steel plates; the raw materials and technical requirements shall comply with the stipulations of GB/T 28268; the strength of the plates shall satisfy the requirements of elastic deformation of the bearings.

7.2 Tolerances

The tolerances of the bearings shall comply with the stipulations of Grade-SP (see Table 2 and Table 3). The bearings may also adopt other tolerance grades specified in GB/T 307.1.

in GB/T 30819. In other words, under the conditions of correct installation, proper lubrication, and normal operating temperature and humidity, when the input speed of the harmonic gear reducers is 2,000 r/min, and it is a rated torque, the designed life of the bearings shall satisfy:

---When applied to Type-CS (cup-shaped standard flexible bearings) and Type-HS (hollow top hat-shaped standard flexible bearings) reducers, the designed life shall be not lower than 10,000 h;

---When applied to Type-CD (cup-shaped short flexible bearings) and Type-HD (hollow top hat-shaped short flexible bearings) reducers, the designed life shall be not lower than 8,000 h.

7.9.2 Durability

After the durability test, the basic parameters and performance of the bearings shall comply with the requirements of this Standard.

7.10 Others

The other technical requirements shall comply with the stipulations of GB/T 307.3 and JB/T 10336, and the requirements for bearings of harmonic gear reducers specified in GB/T 30819. If there are special requirements, they may be determined by the manufacturer and the user through negotiation.

8 Inspection and Test Methods

8.1 Tolerances

The measurement method for the tolerances of bearings shall comply with the stipulations of GB/T 307.2, or, it may be replaced by the measurement of the tolerances of rings. The inner diameter and outer diameter may be measured through the mode of non-contact measurement.

8.2 Radial Internal Clearance

The measurement method for the radial internal clearance of bearings shall comply with the stipulations of GB/T 25769.

8.3 Surface Roughness

The measurement method for the surface roughness of bearings shall comply with the stipulations of JB/T 7051.

8.4 Residual Magnetism

The measurement method for the residual magnetism of bearings shall comply with

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