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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Bearing steel wire rod

轴承钢盘条

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1 Scope

China's national standard for bearing steel wire rod. It specifies the terms and definitions, the order content and the technical requirements. This is the rod from which rolling elements are made - the balls and rollers of every bearing - drawn down, cut, formed and hardened. The requirements on it are the strictest applied to any high tonnage steel, and they concentrate on cleanness. A rolling element fails by subsurface fatigue initiated at a non-metallic inclusion at the depth of maximum shear stress, and the size of the largest inclusion in the volume that sees that stress determines the life. Since the volume is small and the number of elements is enormous, what matters statistically is not the average inclusion content but the extreme value - the largest inclusion likely to appear anywhere in a production lot. That is why bearing steel is made by vacuum degassing and why its acceptance uses extreme value methods rather than an average rating.

This document specifies the order content, dimensions, appearance, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificate of bearing steel wire rod. This document is applicable to the production of bearing steel wire rod (hereinafter referred to as the "wire rod") with a diameter of

32.0 mm, such as: bearing rings and rolling elements, etc.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. 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 223.5 Steel and Iron - Determination of Acid-soluble Silicon and Total Silicon Content - Reduced Molybdosilicate Spectrophotometric Method

GB/T 223.9 Iron, Steel and Alloy - Determination of Aluminum Content - Chrome Azurol S Photometric Method

GB/T 223.11 Iron, Steel and Alloy - Determination of Chromium Content - Visual Titration or Potentiometric Titration Method

GB/T 223.17 Methods for Chemical Analysis of Iron, Steel and Alloy - The Diantipyrylmethane Photometric Method for the Determination of Titanium Content

GB/T 223.23 Iron, Steel and Alloy - Determination of Nickel Content - The Dimethylglyoxime Spectrophotometric Method

GB/T 223.26 Iron, Steel and Alloy - Determination of Molybdenum Content - The Thiocyanate Spectrophotometric Method

GB/T 223.29 Iron, Steel and Alloy - Determination of Lead Content - Carrier Precipitation-xylene Orange Spectrophotometric Method

GB/T 223.31 Iron, Steel and Alloy - Determination of Arsenic Content - Distillation-molybdenum Blue Spectrophotometric Method

GB/T 223.47 Methods for Chemical Analysis of Iron, Steel and Alloy - The Carrier

GB/T 11261 Steel and Iron - Determination of Oxygen Content - The Pulse Heating Inert Gas Fusion-infrared Absorption Method

GB/T 13298 Inspection Methods of Microstructure for Metals

GB/T 18254-2016 High-carbon Chromium Bearing Steel

GB/T 20066 Steel and Iron - Sampling and Preparation of Samples for the Determination of Chemical Composition

3 Terms and Definitions

This document does not have terms or definitions that need to be defined.

4 Order Content

The contracts or orders that purchase products in accordance with this document include, but are not limited to the following content:

- a) Serial No. of this document;
- b) Product name;
- d) Specification;
- e) Weight (or quantity);
- g) Delivery state;
- h) Purpose (if not specified, for rings);
- i) Special requirements.

5 Dimensions, Appearance and Weight

5.1 The dimensions and allowable deviation of the wire rod shall comply with the stipulations of Table 1. If there are special requirements, they shall be negotiated between the supply-side and the demand-side and specified in the contract.

5.2 Appearance and Weight

5.2.1 Each coil consists of one wire rod and shall not have joints. The minimum weight of each coil of wire rod shall be not less than 1,000 kg.

5.2.2 If there are special requirements, they shall be negotiated between the supply-side and the demand-side and specified in the contract.

6.1 Designation and Chemical Composition

6.1.1 The designation and chemical composition (smelting analysis) of steel shall comply with the stipulations of GB/T 18254-2016. The residual elements of wire rods used to make rings shall comply with the stipulations of high-quality steel, high-grade high-quality steel, and special-grade high-quality steel in GB/T 18254-2016. The residual elements of wire rods used to make rolling elements shall comply with the stipulations of high-grade high-quality steel and special-grade high-quality steel in GB/T 18254-2016.

6.1.2 The hydrogen content in steel shall not exceed 0.0002%.

6.1.3 The allowable deviation of the composition of finished steel products shall comply with the stipulations of GB/T 18254-2016.

6.1.4 The wire rods shall be inspected one by one using the spark method or a spectroscope. If the supply-side can guarantee it, the inspection is not required.

6.2 Smelting Method accordance with

7.2.1 and be evaluated in accordance with 7.2.2.2. The qualification level shall not be greater than Level 2.0.

6.7.3 Carbide elutriation The carbide elutriation of the wire rods shall be subject to sampling and sample preparation in accordance with

7.2.1 and be evaluated in accordance with 7.2.2.3. There shall be no carbide elutriation.

6.8 Microstructure The microstructure of the spheroidized annealed wire rods shall be a tiny, uniform and fully spheroidized pearlitic structure, which shall be rated in accordance with the 5th rating diagram of Appendix A in GB/T 18254-2016. Its qualification level is Level 2 ~ Level 4.

6.9 Micropore The wire rods shall be subject to the micropore inspection in accordance with GB/T 18254- 2016. The wire rods shall manifest no micropores.

6.10 Decarburized Layer The depth of the decarburized layer on the surface of the wire rods shall be inspected in accordance with the metallographic method of GB/T 224. The total depth of the decarburized layer on one side shall comply with the stipulations of Table 3.

6.11 Grain Size The qualification level of austenite grain size of the wire rods shall be Level 8 or finer specified in GB/T 6394.

6.12 Surface Quality The head and tail defects of the wire rods shall be removed, and there shall be no defects, such as: cracks, folds, scars, ears and delamination on the surface. Local indentations, bumps, pits, scratches and pitting, etc. are allowed, but their depth or height shall comply with the stipulations of Table 4.

7 Test Methods

7.1 Chemical Composition The chemical analysis method shall comply with the universal methods in GB/T 223.5, GB/T 223.9, GB/T 223.11, GB/T 223.17, GB/T 223.23, GB/T 223.26, GB/T 223.29, GB/T 223.31, GB/T 223.47, GB/T 223.50, GB/T 223.53, GB/T 223.59, GB/T 223.62, GB/T 223.63, GB/T 223.77, GB/T 223.82, GB/T 223.85, GB/T 223.86 or GB/T 4336, GB/T 11261, GB/T 20123, GB/T 20125, etc. The arbitration shall be conducted in accordance with GB/T 223.5, GB/T 223.9, GB/T 223.11, GB/T 223.17, GB/T 223.23, GB/T 223.26, GB/T 223.29, GB/T 223.31, GB/T 223.47, GB/T 223.50, GB/T 223.53, GB/T 223.59, GB/T 223.62, GB/T 223.63, GB/T 223.77, GB/T 223.82, GB/T 223.85, GB/T 223.86, GB/T 11261, GB/T 20123, GB/T 20125.

7.2 Carbide Heterogeneity

7.2.1 Specimen selection In accordance with the stipulations of GB/T 18254-2016, conduct