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Replacing JB/T 1460-2002

Rolling bearings - Bearing parts made from high-carbon chromium stainless steel - Specifications for heat-treatment

滚动轴承 高碳铬不锈钢轴承零件 热处理技术条件

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Foreword

This standard replaces JB/T 1460-2002 “Specifications for heat-treatment of rolling bearing parts made from high carbon chromium stainless steel”.

As compared with JB/T 1460-2002, the main changes of this standard are as follows:

- MODIFY the standard name (Cover and first page of the 2002 version and this version);
- ADD the steel grade G65Cr14Mo (Clause 1 of this version);
- MODIFY the hardness values of the bearing parts after tempering (Clause 3.1.1 of this version; Table 1 of the 2002 version);
- MODIFY the partial quenched and tempered microstructure rating image (Level II diagram of this version and the 2002 version);
- ADD the requirements for tempering stability of bearing parts (Clause 3.2.6 of this version);
- LIST the description of the microstructure level diagram in the Appendix (Appendix E of this version, a) ~ f) in clause 3.2.2.3 of the 2002 version).

Appendix A, Appendix B, Appendix C and Appendix D of this standard are normative appendixes. Appendix E is an informative appendix.

This standard was proposed by China Machinery Industry Federation.

This standard shall be under the jurisdiction of the National Rolling Bearing Standardization Technical Committee (SAC/TC 98).

Drafting organizations of this standard: Luoyang Bearing Research Institute Co., Ltd., Zhejiang Meiyate Precision Machinery Co., Ltd., Jiangsu Dibang Sanxing Bearing Co., Ltd., Pizhou Zhuli Bearing Co., Ltd.

The main drafters of this standard: Ye Jianyi, Lei Jianzhong, Zhou Youhua, Gao Yuan'an, Tan Yongjie, Gao Lijun, Geng Zhongdian, Liang Hua, Wang Zhiyong.

This Standard replaces the standard previously issued as follows:

- JB 1460-1974, JB 1460-1984, JB 1460-1992, JB/T 1460-2002.

Rolling bearings - Bearing parts made from high-carbon chromium stainless steel - Specifications for heat-treatment

1 Scope

This standard specifies the technical requirements, inspection methods and rules for the annealed and quenched & annealed stainless steel rolling bearing rings and rolling elements (hereinafter referred to as bearing parts) which are made from G95Cr18 (original designation 9Cr18), G102Cr18Mo (original designation 9Cr18Mo), G65Cr14Mo that comply with the provisions of GB/T 3086-2008.

This standard applies to the heat-treatment quality inspection of bearing parts made of the above materials.

2 Normative references

The provisions in following documents become the provisions of this standard through reference in this standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 230.1-2009 Metallic materials - Rockwell hardness test - Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)

GB/T 231.1-2009 Metallic materials - Brinell hardness test - Part 1: Test method

GB/T 3086-2008 High carbon chromium stainless bearing steels

GB/T 4340.1-2009 Metallic materials - Vickers hardness test - Part 1: Test method

JB/T 1255-2001 Specification for heat-treatment of rolling bearing parts made from high carbon chromium steel

JB/T 7361-2007 Rolling bearings - Test method for hardness of parts

shall not exceed 1 HRC.

3.2.7 Steel ball crushing load

The value of crushing load after quenching and tempering of steel balls with a nominal diameter (D_w) of 3 mm ~ 50.8 mm shall not be less than the provisions of Appendix D. Steel balls with $D_w < 3$ mm and $D_w > 50.8$ mm may not be subject to crushing load test.

3.2.8 Corrosion resistance

After the bearing parts are subjected to corrosion resistance test, there shall be no rust and pitting on the working surface, it is allowed for the presence of slight erasable slight corrosion and pitting corrosion at the part character location, chamfers and sharp corners.

3.2.9 Steel mixtures

Bearing parts are not allowed to have mixed materials.

3.3 Others

When users have other special requirements, they can negotiate with the manufacturer.

4 Inspection methods and rules

In accordance with the model, specification and quantity of each batch of bearing parts, a certain proportion of bearing parts shall be taken for inspection. The inspection method shall be in accordance with Table 3. If the manufacturer can guarantee that the bearing parts fracture and corrosion resistance are qualified, it can be exempted from the inspection.

Table 3 -- Inspection methods

Inspection item	Inspection methods
Hardness	Hardness test can be performed in accordance with the hardness and size of the tested parts using the Brinell, Rockwell, Vickers or Leeb hardness tester, the test methods shall be in accordance with the provisions of GB/T 231.1-2009, GB/T 230.1-2009, GB/T 4340.1 -2009 and JB/T 7361-2007 For the steel balls with a nominal diameter $D_w \geq 4.762$ mm (3/16 in), the hardness is measured on the spherical surface. For a roller with an effective diameter ≥ 5 mm, the hardness is measured on a cylindrical or conical surface; for the steel ball with a nominal diameter $D_w < 4.762$ mm (3/16 in) and the roller with an effective diameter < 5 mm, the Vickers hardness is measured on the grinding plane. Vickers hardness and Rockwell hardness are converted in accordance with GB/T 1172-1999; Spherical roller hardness is measured at the end surface.

Appendix C

(Normative)

Pickling test procedures

C.1 Cold pickling inspection procedures

This procedure is applicable to the inspection of surface decarburization and soft spots of high carbon chromium stainless steel bearing parts (G95Cr18, G102Cr18Mo, G65Cr14Mo) after heat treatment as well as the grinding burn, grinding crack or other defects that are produced in the grinding process.

C.1.1 Pickling process

C.1.1.1 Degreasing tank

Ingredients: Anhydrous sodium carbonate (Na_2CO_3)3 kg;

Trisodium phosphate ($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)3 kg;

Sodium hydroxide (NaOH)1 kg;

Water glass (Na_2SiO_3) 0.3 kg;

Water (H_2O)100 kg.

Temperature: 75 °C ~ 85 °C.

Time: 2 min or more (until the degreasing is completed finished).

Control Index: Total alkali content (Na_2CO_3) 4% ~ 8%.

C.1.1.2 Cleaning tank

Ingredients: Water (H_2O).

Temperature: 75 °C ~ 85 °C.

Time: 1 min.

C.1.1.3 Flowing cold water tank

Time: 1 min.

C.1.1.4 Pickling tank

Note 1: The bearing parts shall be shaken up and down in each bath solution during pickling.

Note 2: When flushing in a flowing cold water tank, the bearing parts shall ensure that the solution is flushed from tank.

Note 3: The acid etching amount of this pickling process is $2\text{ }\mu\text{m}\sim 4\text{ }\mu\text{m}$, and the amount of pickling shall be considered in the grinding process.

Note 4: The solution components of the degreasing, neutralization, and rust prevention tanks can also be determined by the manufacturer itself.

Note 5: In accordance with the number of pickled parts and the effect of pickling, it shall regularly replace the pickling, brightening solution or supplement its active ingredients.

C.2 Hot pickling inspection procedures

This procedure is applicable to the inspection of cracks of bearing parts after quenching and tempering high-carbon chromium stainless steel (G95Cr18, G102Cr18Mo).

C.2.1 Preparation before hot pickling

The bearing parts must be tempered above $350\text{ }^{\circ}\text{C}$ prior to pickling and the surfaces shall be cleaned by sandblasting or degreasing.

C.2.2 Hot pickling process

Pickling solution composition: 1:1 aqueous hydrochloric acid.

Temperature: $60\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

Pickling time: 10 min ~ 30 min.

C.3 Corrosion resistance test procedures

This procedure applies to the corrosion resistance inspection of high carbon chromium stainless steel (G95Cr18, G102Cr18Mo) bearing parts. The corrosion resistance to dilute nitric acid of G65Cr14Mo steel is somewhat poor, its corrosion resistance inspection to dilute nitric acid can refer to this procedure.

C.3.1 Artificial seawater corrosion resistance test

After the bearing parts are degreased and washed, they are immersed in artificial seawater and boiled for 30 minutes, after stop heating, maintain for 48 h. After removal, use tap water to flush it clean and perform surface visual

Temperature: 75 °C ~ 85 °C.

Time: 1 min.

C.4.1.3 Flowing cold water tank

Time: 1 min.

C.4.1.4 Pickling tanks

Composition: Nitric acid [HNO_3 : d (relative density) = 1.40] 5 kg;

Water (H_2O) 100 kg.

Temperature: Room temperature.

Time: 15 s ~ 30 s.

Control index: Nitric acid [HNO_3 : d (relative density) = 1.40] 3% ~ 5%.

C.4.1.5 Flowing cold water tank

Time: 1 min.

C.4.1.6 Neutralization tank

Ingredients: Anhydrous sodium carbonate (Na_2CO_3) 8 kg;

Water (H_2O) 100 kg.

Temperature: Room temperature.

Time: 1 min.

Control index: Total alkali content (Na_2CO_3) 3% ~ 5%.

C.4.1.7 Flowing cold water tank

Time: 1 min.

C.4.1.8 Antirust tank

Ingredients: Anhydrous sodium carbonate (Na_2CO_3) 0.5 kg;

Sodium nitrite (NaNO_2) 10 kg;

Water (H_2O) 100 kg.

Temperature: Room temperature.

Time: 1 min.

Appendix E

(Informative)

Quenched and tempered microstructure level diagram descriptions

The quenched and tempered microstructure level diagram (see the level II diagram) is described as follows:

- a) First level: Martensite + a large number of residual secondary carbides and primary carbides + a small amount of residual austenite

This structure is formed at the lower limit of the quenching temperature or when the holding time is short. The carbides do not dissolve well and the solid solution concentration is low, so the hardness is often lower than the standard.

- b) Second level: Martensite + a large amount of residual secondary carbides and primary carbides + a small amount of residual austenite

This structure is formed at the lower limit of the quenching temperature or the temperature holding time is slightly shorter, the hardness is generally in the middle and lower limits of the qualified range of the standard.

- c) Third level: Martensite + appropriate residual secondary carbides and primary carbides + a small amount of residual austenite

The structure is formed at a suitable quenching temperature and temperature holding time.

- d) Fourth level: Martensite + slightly residual secondary carbides and primary carbides + a small amount of residual austenite

This structure is formed when the quenching temperature is slightly higher or the temperature holding time is slightly longer.

- e) Fifth level: Martensite + a small amount of residual secondary carbides and primary carbides + a small amount of residual austenite

This structure is formed when the quenching temperature is higher or the temperature holding time is longer, and it is the upper limit structure of the qualified quenching structure.

- f) Sixth level: Martensite + residual secondary carbides and primary carbides + partially residual austenite + twin crystal carbide structure

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