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Rolling bearings - Automotive hub bearing units

滚动轴承 汽车轮毂轴承单元

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Rolling bearings - Automotive hub bearing units

1 Scope

This standard specifies the terms and definitions, symbols, classification, designation method, basic structure type, basic size, technical requirements, matching installation, testing methods, inspection rules, markings, anti-rust packaging, transportation, storage of the hub bearing unit for passenger vehicles (hereinafter referred to as the hub bearing unit).

This standard applies to the production, inspection and acceptance of hub bearing units.

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 standard.

GB/T 272 Rolling bearing - Identification code

GB/T 307.2-2005 Rolling bearings - Measuring and gauging principles and methods

GB/T 307.3-2017 Rolling bearings - General technical regulations

GB/T 699-2015 Quality carbon structural steels

GB/T 2828.1-2012 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 2829-2002 Sampling procedures and tables for periodic inspection by attributes (Apply to inspection of process stability)

GB/T 3077-2015 Alloy structure steels

GB/T 3098.1-2010 Mechanical properties of fasteners - Bolts, screws and studs

GB/T 3103.1-2002 Essential oils and aromatic extracts - Determination of residual benzene content

GB/T 3478.1-2008 Straight cylindrical involute splines - Metric module side fit - Part 1: Generalities

GB/T 3478.5-2008 Straight cylindrical involute splines - Metric module side fit - Part 5: Inspection

GB/T 4199-2003 Rolling bearings - Tolerances - Definitions

GB/T 5617-2005 Determination of effective depth of hardening after induction or flame hardening of steel

GB/T 5671-2014 General purpose lithium lubricating grease for automobile

GB/T 6930-2002 Rolling bearings - Vocabulary

GB/T 7811-2015 Rolling bearings - Symbols for physical quantities

GB/T 8597-2013 Rolling bearings - Rust proof packaging

GB/T 18254-2016 High-carbon chromium bearing steel

GB/T 24605-2009 Rolling bearings - Marking for products

GB/T 24606-2009 Rolling bearings - Non-destructive testing - Magnetic particle testing

GB/T 24610.2-2009 Rolling bearings - Measuring methods for vibration - Part 2: Radial ball bearings with cylindrical bore and outside surface

GB/T 24610.3-2009 Rolling bearings - Measuring methods for vibration - Part 3: Radial spherical and tapered roller bearings with cylindrical bore and outside surface

GB/T 34891-2017 Rolling bearings - Parts made from high-carbon chromium bearing steels - Specifications for heat treatment

JB/T 5000.15-2007 Heavy mechanical general techniques and standards - Part 15: Non-destructive inspection of forged steel

JB/T 6639-2015 Rolling bearings - Rubber seals reinforced with a sheet steel insert - Specifications

JB/T 6641-2017 Rolling bearings - Residual magnetism and its assessment method

JB/T 7048-2011 Rolling bearing parts - Plastic cage - Specifications

JB/T 7051-2006 Rolling bearing parts - Methods for the measurement and assessment of surface roughness

d_{mp1} - d_{mp2}: The difference between the average inner diameters of the two inner rings in a complete set of bearings;

F: Outer diameter of flange;

G: Diameter of flanged inner ring's screw hole or bolt's center circle;

G_1: Diameter of flanged outer ring's screw hole or bolt's center circle;

I: The distance between the reference end face of the flanged hub bearing unit of the outer ring to the mounting plane or the distance between the reference installation planes of the two flanges of the flanged hub bearing units of the outer ring;

K_{ea}: The radial runout of the guidance installation diameter of the brake end as relative to the guidance installation diameter of knuckle end;

K_{ia1}, K_{ia2}: The radial runout of a single inner ring of a complete set of bearings;

K_{ia1} - K_{ia2}: The difference between the tolerance of inner ring's radial runout;

P_{s1}: The position degree of bolt;

P_{s2}: The position degree of threaded hole (plain hole);

S_{m1}: The perpendicularity of the threaded hole (plain hole) to the mounting reference plane;

S_{m2}: The perpendicularity of the bolt to the mounting reference plane;

S_{n1}, S_{n2}: The flatness of the mounting reference plane of flange;

S_{ea}: The axial runout of the mounting reference plane of brake end;

Δ_{Ds}, Δ_{D1s}: The deviation of installation guidance diameter of flange;

Δ_{ls}: Deviation of distance between the mounting reference planes of two flanges.

5 Classification

5.1 The hub bearing unit is divided as follows according to its structural type features:

- Double-row angular contact ball hub bearing unit or double-row tapered roller hub bearing unit;
- Double-row angular contact ball hub bearing unit or double-row tapered roller hub bearing unit with flanged outer ring;

of hub bearing units shall comply with the provisions of the product drawings.

9.6 Vibration

The vibration of the hub bearing unit shall comply with the provisions of the product drawings.

9.7 Lubrication and sealing

9.7.1 The hub bearing unit shall be filled with the No.3 automobile general-purpose lithium-base grease which complies with the provisions of GB/T 5671-2014. It may also use other greases with comparable or better performance. The grease filling amount is about 30% ~ 50% of the effective space volume inside the hub bearing unit. If the user has special requirements for grease and grease filling amount, it is determined through negotiation between the manufacturer and the user.

9.7.2 The sealing device of the hub bearing unit shall be intact. After the high-speed durability test, the maximum temperature of the hub bearing unit shall not exceed 120 °C, meanwhile the grease leakage rate shall not exceed 10%.

9.7.3 The sealing device of the hub bearing unit shall have good mud-proof performance. After the 144 h mud-water performance test, the hub bearing unit shall rotate flexibly; there shall be no signs of peeling, cracking, muddy water intrusion, grease discoloration, etc. The increase of the moisture content of the grease of the hub bearing unit near the cage and the raceway shall not exceed 3%.

9.8 Bolt

The hub bearing unit shall use the bolt which has a performance grade not exceeding 10.9 in accordance with GB/T 3098.1-2010; its dimensional accuracy shall be in accordance with grade A of GB/T 3103.1-2002. The anti-slip torque of bolt on the hub bearing unit is: not lower than 150 N·m for the M12 bolt; not lower than 250 N·m for the M14 bolt; the pull-out resistance shall be not lower than 4.9 kN.

9.9 Friction torque

The friction torque of the double-row angular contact ball hub bearing unit shall not exceed 1.7 N·m; the friction torque of the double-row tapered roller hub bearing unit shall not exceed 2.5 N·m; or comply with the provisions of the product drawings. If the user has special requirements for the friction torque, it

For DU type, DUF type, DU2F type hub bearing unit, when the measurement result is controversial, the axial clearance is measured by the method as specified in JB/T 8236-2010. Meanwhile the clearance value obtained by this shall prevail.

11.5 The negative axial clearance of hub bearing unit is measured by a dedicated measuring instrument. The measurement principle is generally based on the displacement method. After testing the height and axial clearance before pressing the inner ring, the height after pressing the inner ring, the height before rotate-rivet the inner ring, the height after rotate-rivet the inner ring, calculate the negative axial clearance after rotate-riveting.

11.6 The measurement of residual magnetism of the hub bearing unit is in accordance with JB/T 6641-2017.

11.7 The measurement of vibration of the DAC type, DACF type, DAC2F type hub bearing unit is carried out according to GB/T 24610.2-2009, wherein the test speed is 900 r/min. The measurement of vibration of the DU type, DUF type, DU2F type hub bearing unit is carried out according to the provisions of GB /T 24610.3-2009.

11.8 The test of sealing performance of the hub bearing unit is carried out according to the high-speed durability test and mud-water performance test method as specified in JB/T13353-2017.

11.9 The performance testing of bolts of wheel bearing unit is in accordance with GB/T 3098.1-2010. The measurement of anti-slip torque of the bolt is checked by an indicator type torque wrench which has an accuracy greater than 1 N·m. The measurement of the resistance to pull-out of the bolt is as follows: allow the bolt of the hub bearing unit to face upwards; fix the outer ring or the flange; press the indenter of the universal testing machine against the end of the bolt rod; under the condition of slow moving without producing shock, use the speed of not more than 5 mm/min to apply a downward load, until the bolt is detached; read the pull-out force of the bolt form the indicator.

11.10 The testing of the friction torque of the hub bearing unit is carried out according to the friction torque test method as specified in JB/T 13353-2017.

11.11 The testing of the sensor of hub bearing unit is carried out according to the provisions of QC/T 783-2007 or QC/T 824-2009. The number of teeth of the ring gear, the number of pole pairs of the magnetic encoder AND the magnetic field strength of the magnetic encoder are tested at a speed of 60 r/min ~ 240 r/min and an air gap of 0.5 mm ~ 1.5 mm. They may also be as specified according to the drawing.

11.12 Non-destructive testing of hub bearing unit's ferrules and rolling elements shall be in accordance with GB/T 24606-2009 and JB/T 5000.15-2007.

- In case of type finalization of new products;
- In case of major changes in product design, materials, processes, etc., which may affect product quality and performance;
- After two years of continuous production of a product;
- The production is restored after suspension for more than half a year;
- In case of significant difference between the exit-factory inspection result and the previous type inspection;
- The National Quality Supervision Agency requests the type inspection.

12.3.2 The type inspection products shall be taken from the same batch of products that have passed the exit-factory inspection. The exit-factory inspection items shall be re-inspected first. After passing the re-inspection, carry out the bench simulation test for service life, sealing performance, bolt anti-slip torque, bolt pull-out resistance, friction torque of bolt. In the test and evaluation of general durability, high-speed durability, muddy water performance, bolt anti-slip torque, bolt pull-out resistance, friction torque, according to the provisions of GB/T 2829-2002, take the rejected quality level RQL as 40; the judgement level is I; use the one sampling scheme; the sample size for each is 2; the number of qualified judgments for each batch of tests is 0; the number of unqualified judgments is 1.

13 Marking

The marking of the hub bearing unit is in accordance with the provisions of GB/T 24605-2009.

14 Anti-rust packaging

The anti-rust packaging of the hub bearing unit is in accordance with the provisions of GB/T 8597-2013.

15 Transportation and storage

Under normal storage and transportation conditions, the hub bearing unit shall ensure no rust within one year. The rust prevention period shall be calculated from the date of exit-factory.

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