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

GB/T 42613-2023

**Plain bearings - Testing of bearing materials - Resistance to
corrosion by lubricants under static conditions**

滑动轴承 轴承材料试验 静态条件下抗润滑剂腐蚀能力

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1 Scope

GB/T 42613-2023 gives the static test for the resistance of plain bearing materials to corrosion by lubricants. The lead-free bearing alloys that replaced the old ones are more vulnerable to this than what they replaced: modern engine oils carry acidic degradation products and additive packages that attack copper, tin and zinc, and the attack happens while the engine is standing rather than while it is running, which is why the test is static. A bearing corroded in this way loses material from the running surface before it has done any work. The standard sets the health and safety provisions, the general rules, the lubricants, the apparatus, the preparation of the specimens, the test procedure, the evaluation of the results and the test report. It took effect on 1 December 2023.

This document describes the test methods for the resistance of bearing materials to lubricant corrosion AND establishes the most important general testing principles. This document is applicable to the testing of lubricant corrosion resistance of bearing materials AND the selection of bearing materials.

2 Normative references

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Corrosion A reaction of the bearing material with the environment, that results in measurable corrosion damage changes in the bearing material.

Note: In most cases, the nature of this reaction is a chemical reaction; however, it may also involve chemical or mechanical processes. This document does not deal with material changes, that would only occur or be detected concurrently with mechanical action. For a detailed description of the various causes of damage to sliding bearings, see ISO 7146-1.

4 Health and safety

Raw materials, specimens, test materials, test equipment, test procedures shall comply with current health and safety laws and regulations. Where equipment, materials and/or reagents that may be hazardous to health have been designated, appropriate precautions shall be taken, in accordance with laws and regulations.

5 General rules

5.1 Corrosion tests are usually conducted, in the form of comparative tests, that is, multiple bearing materials and lubricants are compared with each other. However, the test may also include reference materials or reference lubricants with known properties.

5.2 In order to obtain precise information on the corrosion behavior of the material under test and the reference materials that may be involved at the end of the test under given test conditions, the test duration shall be chosen appropriately AND extended if necessary.

5.3 Due to the high discreteness of a single material test result (which is often the case when measuring material quality changes), its reference is low, so the test results shall be the mean of at least 3 tests.

6 Lubricant

The amount of lubricant, which is used on the surface of bearing materials, shall be at least 10 mL/cm². Indicate the specifications of the lubricant used in the test, including lubricant type and performance grade information. In order to obtain the desired results (e.g., additives used in the lubricants and their effects), the following chemical and physical information should be given: - Density (15 °C), the unit is grams per milliliter (g/mL), that is, grams per cubic centimeter (g/cm³); - Flash point, in degrees Celsius (°C); - Neutralization value; - Saponification value; - Base number; - Kinematic viscosity (40 °C), in square millimeters per second (mm²/s); - Kinematic viscosity (100 °C), in square millimeters per second (mm²/s); - Sulfate ash, which is calculated by mass fraction; - Zinc content, which is calculated by mass fraction; - Phosphorus content, which is calculated by mass fraction; on the beaker to prevent dust.

c) In principle, only specimens of the same bearing material are placed in the same beaker

for test, to avoid interaction. The test environment shall not contain any substances, that interfere with the test.

d) During the test, keep the temperature of the beaker within ± 2 °C of the specified test temperature. The recommended test temperatures are 80 °C, 100 °C, 120 °C, 150 °C, 180 °C. The test duration shall be at least 20 d, which can be extended, if necessary (see 5.2). Interim evaluations shall be conducted, one week later and two weeks later. The test duration and temperature should be selected according to the specific application environment of the bearing.

e) Before the interim evaluation and final evaluation, use an appropriate solvent to spray the specimen OR use other methods to clean it. Drying is carried out in a hot air cabinet, until the sample mass is constant. Record specimen mass and dimensions.

10 Test results

10.1 Mass changes Only when the surface of the tested specimen is uniformly corroded, the specimen mass change data will have reference value. The change in specimen mass (mass loss or gain) shall be taken as the mean of at least 3 specimens.

10.2 Dimensional changes Only when the surface of the tested specimen is uniformly corroded, the specimen's dimensional change data will have reference value. The dimensional changes (size reduction or increase) of the specimen shall be taken as the mean of at least 3 samples.