

ICS 21.100.10
CCS J 12



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

GB/T 47254-2026

**Plain bearings - Dynamic adhesion test method for DLC coated
parts under lubricated condition**

滑动轴承 润滑条件下DLC涂层部件的动态附着力测试方法

(English Translation)

Issued on: February 27, 2026

Implemented on: June 1, 2026

Issued by: State Administration for Market Regulation

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document adopts ISO 4821:2022 "Dynamic adhesion test method for DLC coated parts under lubrication conditions of sliding bearings".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Machinery Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Sliding Bearings (SAC/TC236).

Introduction

Reducing engine mechanical losses is one of the effective ways to improve vehicle fuel efficiency. To reduce the coefficient of friction between engine components, Diamond-like carbon (DLC) coatings can be applied to sliding bearings and other sliding components such as valve tappets and piston rings.

Because the preparation of diamond-like carbon (DLC) hard coatings requires high temperatures, and there is a thermal relationship between the DLC coating and engine components...

Due to differences in their coefficients of thermal expansion, these components exhibit higher internal stresses. Therefore, quality control of the bonding strength between the coating and the substrate on specific parts after coating preparation is crucial.

Yes. Given the current lack of applicable official testing methods, automakers or parts suppliers must use specially designed testing equipment.

The bonding strength was verified through actual engine components. To further promote the application of DLC coatings in engine mechanical components in the future, it is urgent to establish a convenient test method for evaluating the bonding strength of coatings.

This document aims to provide a testing method for evaluating the adhesion strength of diamond-like carbon (DLC) coatings. The testing method specified in this document...

A simple ball-and-disc test setup, whose structure is consistent with traditional engine evaluation results, is used, along with a relatively cost-effective acoustic emission test...

Measuring instruments can complete tests without using actual parts.

The testing phases for evaluating part performance using this test method by automakers or component suppliers are detailed in Appendix A, and the tests specified in this document are also included.

The correlation between the results obtained by this method and the results obtained by traditional engine component testing methods is shown in Appendix B.

DLC-coated components under sliding bearing lubrication conditions Dynamic adhesion test method

1 Scope

This document specifies the method for measuring diamond-like carbon as defined in ISO 20523 under lubricated conditions by detecting acoustic emission signals using the ball-disc method.

Test methods for the adhesion of diamond-like carbon (DLC) coated parts. Diamond-like carbon coatings are typically applied to metal or ceramic substrates.

The test results are not applicable to unlubricated DLC-coated parts.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

ISO 683-17 Heat-treatable steels, alloy steels and free-cutting steels - Part 17: Steels for

ball and roller bearings ISO 1101 Product Geometric Specification (GPS) - Geometric Tolerances. Shape, Orientation, Position and Runout Tolerances run-out Note. GB/T 1182-2018 Product Geometric Specification (GPS) - Geometric Tolerances - Shape, Orientation, Position and Runout Tolerances (ISO 1101:2017) MOD) ISO 21920-2 Product Geometry Specification (GPS) Surface Texture. Profile Part 2: Terms, Definitions and Surface Texture Parameters

3 Terms and Definitions

The following terms and definitions apply to this document.

bal-on-disk method

Test method for sliding contact between a fixed ball and a rotating disk specimen.

Acoustic emission; AE Mechanical vibrations caused by abrupt changes within a material under stress are usually a characteristic of defects.

Adhesion strength

Load on diamond-like carbon (DLC) coating peeling when acoustic emission (3.2) signal suddenly increases.

4.1 General Rules

The geometry of the specimen spheres and disk must be prepared according to requirements. A three-sphere layout should be used to ensure uniform load-bearing capacity of each sphere. (This is followed by a seemingly unrelated sentence about sphere-disc testing.)