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

GB/T 45593-2025

**Fine ceramics - Determination of the abrasion resistance of
coatings by micro-scale abrasion test**

精细陶瓷 微磨损试验测定涂层的耐磨性

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is modified to adopt ISO 26424:2008 "Fine ceramics (advanced ceramics, advanced technical ceramics) - Determination of the wear resistance of coatings using the

microwear test" Wear resistance of the layer.

Compared with ISO 26424:2008, this document has many structural adjustments. Comparison table of structural number changes between the two documents See Appendix A. This document has many technical differences compared to ISO 26424:2008.

A single line (|) is used to indicate these technical differences. A summary of these technical differences and their reasons is given in Appendix B. The following editorial changes were made to this document.

--- In order to coordinate with the existing standards, the name of the standard is changed to "Determination of wear resistance of coatings by fine ceramic micro-wear test";

--- Added "Note" in Chapter 1 to improve the operability of this document;

--- Added "Note" in 3.1 to list the units of wear rate to improve the operability of this document;

--- Added the calculation formula of steel ball speed in the "Notes" of 7.2.1 and 7.3.2 to improve the operability of this document;

--- Added Appendix A (informative) "Comparison of this document with ISO 26424:2008 structure numbering";

--- Added Appendix B (informative) "Technical differences between this document and ISO 26424:2008 and their causes".

1 Scope

This document describes the microwear method for determining the wear rate of fine ceramic coatings based on the ball crater method for determining the thickness of ceramic coatings in ISO 26423 [2]. Test method.

Note: This document obtains the wear rate of the coating and substrate through two independent ball pit tests or a single ball pit series test.

This document is applicable to the testing of specimens with planar or non-planar surfaces. The result analysis described in this document (Chapter 9) is only applicable to planar tests.

For non-planar samples, numerical methods are used for analysis [3], [4].

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date

applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 27025 General requirements for the competence of testing and calibration laboratories (GB/T 27025-2019, ISO /IEC 17025:2017, IDT)

ISO 3290-1 Rolling bearings-Balls-Part 1: Steel balls

Note: GB/T 308.1-2013 Rolling bearing balls Part 1: Steel balls (ISO 3290-1:2008, NEQ)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Abrasive wear rate

Material wear volume per unit sliding distance under a normal contact load of 1N.

Note: The unit is cubic meter per Newton meter [$\text{m}^3/(\text{N}\cdot\text{m})$].

4 Principle

During the test, the grinding slurry is dripped into the contact area between the ball and the sample, and the ball is pressed on the sample and rotated, and a spherical concave When the coating is not worn through, the wear rate of the coating is obtained from a single ball pit; when the coating is worn through, the wear rate of the coating is obtained by measuring the size of the pit.

The size of these craters is measured and the wear rates of the coating and substrate are calculated.

5.1 Test system

Using a test ball that can rotate and press on the surface of the coating sample, there are two types of test ball systems. one is a free ball system, The deadweight of the test ball presses against the test specimen [see Figure 1a)]. Under normal circumstances, the inclination angle is $60^\circ\sim 75^\circ$ and the shaft groove width is 10mm; the other is