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

GB/T 18449.1-2024

**Metallic materials - Knoop hardness test - Part 1: Test method
(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 part 1 of GB/T 18449 Knoop hardness test for metallic materials: GB/T 18449 has been published as follows part:

- Part 1: Test methods;
- Part 2: Verification and calibration of hardness testers;
- Part 3: Calibration of standard hardness blocks;

--- Part 4: Hardness value table:

This document replaces GB/T 18449.1-2009 "Metallic materials Knoop hardness test Part 1: Test method" and partially replaces GB/T 9790-2021 "Vickers and Knoop microhardness test for metal and other inorganic coatings of metallic materials":

GB/T 18449.1-2009 is the main version, and part of GB/T 9790-2021 is integrated:

In addition to structural adjustments and editorial changes, the main technical changes are as follows:

--- Changed the scope, added that this document also applies to metals and other inorganic coatings, and extended the lower limit of the Knoop hardness test force to 0.009807N (see Chapter 1, Chapter 1 of GB/T 18449.1-2009);

--- Added the resolution requirements of the indentation measurement system corresponding to different diagonal length measurement ranges (see Table 2);

--- The increased specimen thickness or test layer thickness should be at least 1/3 of the diagonal length of the indentation (see 7.3);

--- Added the determination of Knoop hardness of metal and other inorganic coatings (see 7.5);

--- Added typical test forces HK0.001, HK0.002 and HK0.005 (see Table 3);

--- Increased period verification (see 8.3);

--- Changed the target values of force application time and holding time under maximum force (see 8.6, Chapter 7 of GB/T 18449.1-2009);

--- Added the minimum distance between adjacent indentations and the minimum distance between any indentation and the edge of the specimen (see Figure 3);

--- Added requirements for hardness conversion method (see Chapter 10);

--- Added the normative appendix "Determination of Knoop hardness of metals and other inorganic coatings" (see Appendix A);

--- Changed Appendix B to a normative appendix, added the period inspection content of the diagonal length measurement system and the pressure head, and added the table B:1HK maximum allowable deviation value and added pressure head inspection (see Appendix B, Appendix A of GB/T 18449.1-2009):

This document is modified to adopt ISO 4545-1:2023 "Knoop hardness test for metallic materials - Part 1: Test method":

The technical differences between this document and ISO 4545-1:2023 and their reasons are as follows:

--- Replaced ISO 4545-2:2017 (see Chapter 6, Appendix B) with the normative reference GB/T 18449.2 to adapt to my country's technical requirements:

Technical conditions and increase operability;

--- ISO 4545-3 (see Appendix B) has been replaced by the normative reference GB/T 18449.3 to adapt to my country's technical conditions and increase Operability;

--- Added normative reference to JJG1047 (see 6.1) to adapt to my country's technical conditions and increase operability:

The following editorial changes were made to this document:

--- Replaced ISO 14577-1 with the informative reference GB/T 21838.1 (see Chapter 1, 8:9);

--- Replaced ISO 14577-2 with the informative reference GB/T 21838.2 (see 8.9);

--- Replaced ISO 14577-3 with the informative reference GB/T 21838.3 (see 8.9);

--- Replaced ISO 4545-4 with the informative reference GB/T 18449.4 (see 8.10);

--- Added the informative reference to JJF1059.1 (see Chapter 9);

--- ISO 1463 is replaced by the informative reference GB/T 6462 (see Appendix A);

--- Replaced ISO 14577-4 with the informative reference GB/T 21838.4 (see Appendix A);

--- Corrected the reference errors of international standards (see Appendix D):

Introduction

GB/T 18449 "Knoop hardness test for metallic materials" is intended to standardize the Knoop hardness test method for metallic materials, the inspection and calibration of hardness testers:

The calibration and hardness value of standard hardness blocks, etc:

GB/T 18449 consists of 4 parts:

--- Part 1: Test methods;

--- Part 2: Verification and calibration of hardness testers;

--- Part 3: Calibration of standard hardness blocks;

--- Part 4: Hardness value table:

This document provides the test method for Knoop hardness:

Knoop hardness test for metal materials Part 1: Test methods

1 Scope

This document specifies the principle, hardness tester, specimen, test procedure, uncertainty of results and test report for the Knoop hardness test of metals:

This document specifies the Knoop hardness test with a test force range of 0:009807N~19:613N:

This document specifies the Knoop hardness test with an indentation diagonal length of not less than 0:020 mm:

Imperfections in the indenter geometry lead to large uncertainties and the use of this method to determine the Knoop hardness from smaller indentations is beyond the scope of this document:

The results will be within a certain range because of the great uncertainty:

This document also specifies the periodic inspection method for users to perform daily inspections on hardness testers:

The Knoop hardness test specified in this document is also applicable to metallic and other inorganic coatings, including electrophoretic coatings on aluminum substrates, self-catalyzed coatings, Chemical coating, spray coating and anodic coating:

This document applies to indentation measurements perpendicular to the surface of the coating and to cross-sectional measurements, provided that the characteristics of the coating (smoothness, thickness etc.) allows accurate reading of the diagonal of the indentation:

This document is not applicable to coatings with a thickness less than 0:007 mm when tested perpendicular to the surface of the covering layer and to coatings with a cross-section thickness less than 0:007 mm when tested perpendicular to the surface of the covering layer:

For coatings with a thickness of less than 0:020 mm, GB/T 21838.1 can be used to determine the hardness of smaller indentations:

2 Normative references

The contents of the following documents constitute the 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 18449.2 Knoop hardness test for metallic materials Part 2: Verification and calibration