

# JIS

JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

---

---

JIS Z 2251-1 : 2020

(JISF)

**Knoop hardness test—  
Part 1: Test method**

---

ICS 77.040.10

Reference number : JIS Z 2251-1 : 2020 (E)

Z 2251-1 : 2020

Date of Establishment: 2020-12-21

Date of Public Notice in Official Gazette: 2020-12-21

Developed by: The Japan Iron and Steel Federation

Investigated by: The Japan Iron and Steel Federation,  
Standardization Center

---

JIS Z 2251-1:2020, First English edition published in 2021-04

Translated and published by: Japanese Standards Association  
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

---

In the event of any doubts arising as to the contents,  
the original JIS is to be the final authority.

© JSA 2021

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

AT

PROTECTED BY COPYRIGHT

## Contents

	Page
Introduction .....	1
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Principle .....	2
5 Symbols and designation of hardness number .....	3
5.1 Symbols and designations .....	3
5.2 Designation of hardness number .....	3
6 Testing machine .....	4
6.1 Testing machine .....	4
6.2 Indenter .....	4
6.3 Diagonal measuring system .....	4
7 Test piece .....	5
7.1 Test surface .....	5
7.2 Preparation .....	5
7.3 Thickness .....	5
7.4 Support of unstable test pieces .....	5
8 Test procedure .....	5
8.1 Test temperature .....	5
8.2 Test force .....	5
8.3 Periodic verification .....	6
8.4 Test piece support and position .....	6
8.5 Focus on the test surface .....	6
8.6 Test force application .....	6
8.7 Prevention of the effect of shock or vibration .....	7
8.8 Minimum distance between adjacent indentations .....	7
8.9 Measurement of diagonal length .....	8
8.10 Calculation of hardness value .....	8
9 Uncertainty of the results .....	8
10 Test report .....	9
Annex A (normative) Procedure for periodic checking of the testing machine, diagonal measuring system and the indenter by the user .....	10
Annex B (informative) Uncertainty of the measured hardness values .....	12
Annex C (informative) Knoop hardness measurement traceability .....	20

Annex D (informative) CCM — Working group on hardness .....	24
Annex E (informative) Adjustment of Köhler illumination systems .....	25
Annex JA (informative) Comparison table between JIS and corresponding International Standard .....	27

## Foreword

This Japanese Industrial Standard has been established by the Minister of Economy, Trade and Industry based on the provision of Article 14, paragraph (1) of the Industrial Standardization Act in response to a proposal for establishment of Japanese Industrial Standard with a draft being attached, submitted by The Japan Iron and Steel Federation (JISF), an accredited standards development organization. This Standard partially replaces **JIS Z 2251**:2009, which has been withdrawn.

This **JIS** document is protected by the Copyright Act.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, published patent application or utility model rights. The relevant Minister is not responsible for identifying any of such patent rights, published patent application or utility model rights.

**JIS Z 2251** series consists of the following 2 parts under the general title *Knoop hardness test*:

*Part 1: Test method*

*Part 2: Table of hardness values*

Blank

# Knoop hardness test—Part 1: Test method

## Introduction

This Japanese Industrial Standard has been prepared based on **ISO 4545-1:2017**, Edition 2, with some modifications of the technical contents.

The dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

## 1 Scope

This Standard specifies the Knoop hardness test method for metallic materials for test forces from 0.009 807 N to 19.613 N.

The Knoop hardness test specified in this Standard is for lengths of indentation diagonals  $\geq 0.020$  mm; it may be used for lengths of indentation diagonals  $< 0.020$  mm upon agreement between the parties involved. **ISO 14577-1** allows the determination of hardness from smaller indentations.

A periodic verification method is specified for routine checking of the testing machine in service by the user.

Special considerations for Knoop testing of metallic coatings can be found in **ISO 4516**.

**NOTE 1** Using the method specified in this Standard for determination from indentations  $< 0.020$  mm in diagonal length may cause large uncertainties in the results.

**NOTE 2** The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 4545-1:2017 *Metallic materials—Knoop hardness test—Part 1: Test method* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

## 2 Normative references

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7734 *Knoop hardness test—Verification and calibration of testing machines*

JIS G 0202 *Glossary of terms used in iron and steel (Testing)*