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Knoop hardness test — Verification of testing machines

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hardness, verification

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS B 7734 : 1991** is replaced with **JIS B 7734 : 1997**.

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Knoop hardness test—Verification of testing machines

Introduction This Standard is the Japanese Industrial Standard prepared based on, without changing the technical contents, **ISO 4546 Metallic materials—Hardness test—Verification of Knoop hardness testing machines** issued in 1993 as the first edition. In this Standard, the lower limit of the diagonal length of the indentation is not specified while the applicable range for the diagonal length of the indentation is not less than 20 μm in the corresponding International Standard.

1 Scope This Standard specifies the direct verification method and the indirect verification method of the testing machine to be used for the Knoop hardness test in accordance with **JIS Z 2251**.

The indirect verification method can be used in the daily accuracy control of the testing machine.

Remarks: The corresponding International Standard to this Standard is as follows.

ISO 4546 *Metallic materials—Hardness test—Verification of Knoop hardness testing machines*

2 Normative references The normative references to this Standard are as follows.

JIS B 7735 *Vickers hardness test—Calibration of the reference blocks*

JIS Z 2244 *Vickers hardness test—Test method*

JIS Z 2251 *Knoop hardness test—Test method*

3 General conditions Before a Knoop hardness testing machine is verified, it shall be checked to ensure that:

- a) the testing machine is properly set up;
- b) the indenter axis of the testing machine is perpendicular to the sample receiving base;
- c) the test force can be applied, kept and removed without shock or vibration in the loading device, and the indentation can be formed normally by the indenter;
- d) the length of the diagonal of the indentation can be appropriately measured by the measuring device. However, the measuring device need not be integral with the body of the testing machine.

4 Direct verification Direct verification is performed at the temperature of $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. When the direct verification is performed outside the range of the temperature, that temperature shall be described in the report.

4.1 Verification of test force The verification of test force shall be as follows.

- a) Verification of the test forces shall be repeated 3 times respectively at three positions in the working range of the indenter axis in accordance with the following practices.

- 1) Each test force of the testing machine shall be verified.
 - 2) The test force shall be verified in the direction in which the test force is increased.
 - 3) Attention shall be paid to the fact that the force by the mass of the indenter is also a part of the test force.
- b) The force measuring instrument used in verification of the test force shall be calibrated to an accuracy of 0.2 % or better.
- c) Tolerance of the test force is given in Table 1.

Table 1 Tolerance of test force

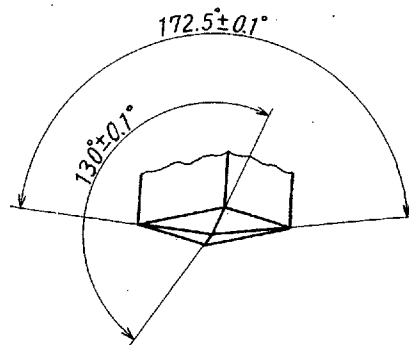
Range N of test force (F)	Tolerance %
$F \geq 1.961$	± 1.0
$0.098\ 07 \leq F < 1.961$	± 1.5

Remarks: The method to verify the mass of the weight may be acceptable for the test force of the direct load system by weight. The tolerance of the mass of the weight shall be ± 0.5 % to the mass converted from the nominal test force of the weight.

The minimum test force shall be directly verified.

4.2 Verification of Indenter The indenter shall be verified as follows.

- a) The diamond part in contact with the sample of the indenter shall be of well polished surface, free from any cracks or surface flaws, and sharp at the line of junction.
- b) The shape of the indenter shall be verified by measuring the angle of each line of junction to the center axis of the indenter using the instrument to measure the accuracy which is capable of guaranteeing the tolerance to the shape.
- c) The indenter tip shall be a diamond in the form of a right pyramid with a rhombic base such that the first angle at the vertex between two opposite edges is $172.5^\circ \pm 0.1^\circ$ and the second angle $130^\circ \pm 0.1^\circ$ (refer to Fig. 1).

**Fig. 1 Knoop indenter**

- d) The center axis of the right pyramid with the rhombic base of the indenter shall be $90^\circ \pm 0.5^\circ$ to the seat surface of the holder.