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Sintered metal materials— Specification

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Z 2550 : 2000

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 the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS Z 2550 : 1989** is replaced with **JIS Z 2550 : 2000**.

Date of Establishment: 1983-11-01

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In the event of any doubts arising as to the contents,
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Sintered metal materials—Specification

Introduction This Japanese Industrial Standard has been prepared based on **ISO 5755 Sintered metal materials—Specifications** published as the first edition in 1996, however, specified items which give standard values are different between **JIS** and **ISO**, and a side-by-side comparison between corresponding items to achieve conformity was impossible. In this revision, materials in **ISO** are adopted, and materials in **JIS** are specified in the Annex to be able to be jointly used.

However, since the specifications in the original International Standard are now under review, care shall be taken when using material symbols of **ISO**.

Further, the portions with sidelines or dotted underlines in this Standard are matters relating to characteristics tests of materials in the Annex which are not in the corresponding International Standard.

1 Scope This Standard specifies the chemical composition, mechanical and physical properties of sintered metal materials used for bearings and mechanical parts.

- Remarks 1** On selection of powder metallurgical materials, it is necessary to consider that the material properties depend not only on the chemical composition and density but also on the manufacturing method. The properties of sintered materials giving satisfactory service in particular applications may not necessarily be the same as those of wrought or cast materials that might otherwise be used. Therefore, liaison with prospective suppliers is recommended.
- 2** The corresponding International Standard to this Standard is shown as follows.

ISO 5755 *Sintered metal materials—Specifications*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

JIS Z 2202 *Test pieces for impact test for metallic materials*

JIS Z 2241 *Method of tensile test for metallic materials*

Remarks : **ISO 6892 Metallic materials—Tensile testing at ambient temperature** is equivalent to the said standard.

JIS Z 2242 *Method of impact test for metallic materials*

JIS Z 2244 *Vickers hardness test—Test method*

JIS Z 2245 *Rockwell hardness test—Test method*

Remarks : Though **ISO 4498-1 Sintered metal materials (excluding hardmetal)—Determination of apparent hardness—Part 1** is a standard of which application is limited to sintered materials, the testing method is equivalent to the said standard.

JIS Z 2501 *Sintered metal materials—Determination of density, oil content, and open porosity*

Remarks : **ISO 2738** *Permeable sintered metal materials—Determination of density, oil content and open porosity* is identical with the said standard.

JIS Z 2507 *Sintered metal bearing—Determination of radial crushing strength*

Remarks : **ISO 2739** *Sintered metal bushes—Determination of radial crushing strength* is identical with the said standard.

3 Sampling Sampling is carried out in accordance with the relevant Japanese Industrial Standard.

4 Testing methods In order to evaluate the properties given in Attached Table 1 to Attached Table 9 and Annex, the following testing methods shall apply.

4.1 Chemical composition The constituent analysis, as far as possible or in the case of dispute, is executed by the method specified in the relevant Japanese Industrial Standard. In case where the relevant JIS does not exist, the analysis method shall be as agreed upon between the purchaser and the supplier.

4.2 Open porosity The open porosity shall be tested in accordance with JIS Z 2501.

4.3 Oil content The oil content shall be tested in accordance with JIS Z 2501.

4.4 Tensile strength The tensile strength shall be tested by using the test piece as given in Attached Fig. 1 in accordance with JIS Z 2241.

4.5 Apparent hardness The apparent hardness shall be tested in accordance with JIS Z 2244 or JIS Z 2245.

4.6 Impact strength The impact strength shall be tested by using the test piece as given in Attached Fig. 2 in accordance with JIS Z 2202.

4.7 Mechanical properties

4.7.1 General The values given in Attached Tables 1 to 9 and Annex shall be determined on pressed and sintered test pieces at chemical composition and are intended as a guide to initial selection of materials. They may also be used as a basis for specifying any special tests which may be indicated on the drawing.

The mechanical properties shall neither be calculated from hardness values, nor be determined on tensile test pieces taken from a component, and used for verifying the values given in the Tables. If the customer requires that a specified level of mechanical properties shall be obtained by tests on the component, these shall be agreed with the supplier and shall be stated on the drawing and/or any specified technical documentation of the customer referred to on the drawing.

4.7.2 Tensile properties The reference values of tensile strength shall be determined in accordance with JIS Z 2241 by using the pressed and sintered test piece as given in 4.4 or by using the machined test piece for heat treated material.

4.7.3 Apparent hardness The reference values of apparent hardness (Vickers hardness and Rockwell hardness) shall be determined in accordance with **JIS Z 2244** and **JIS Z 2245**.

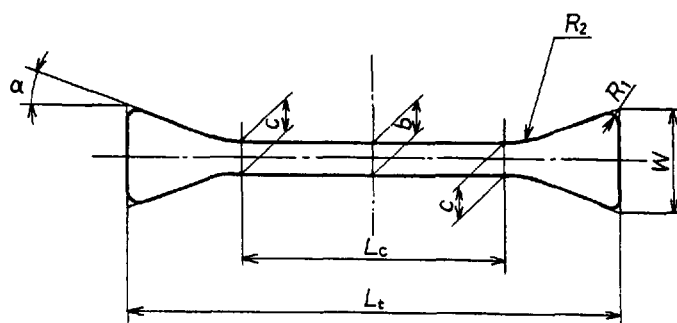
If the hardness values are specified as the product test in the acceptance test, the required value together with the measuring position shall be jointly recorded on the drawing of the product (4.7.1).

4.7.4 Radial crushing strength The radial crushing strength shall be determined in accordance with **JIS Z 2507**. The wall thickness of the test piece shall be within the range specified in **JIS Z 2507**. For test pieces with wall thicknesses outside this range, the specified radial crushing strength values are different and shall be agreed between customer and supplier.

5 Specifications Chemical composition and mechanical properties are shown in Attached Table 1 to Attached Table 9 and Annex.

The content of lubricant of a bearing material impregnated with liquid lubricant shall be at least 90 % of open porosity.

The material assorting symbols of Attached Table 1 to Attached Table 9 comprises 6 characters, and the sixth character is N (in the table it is printed as “-”), or sometimes Z. The N is used when the material does not receive post-treatment, and the Z is used when it receives post-treatments such as heat treatment, phosphate treatment, steam treatment or the like.



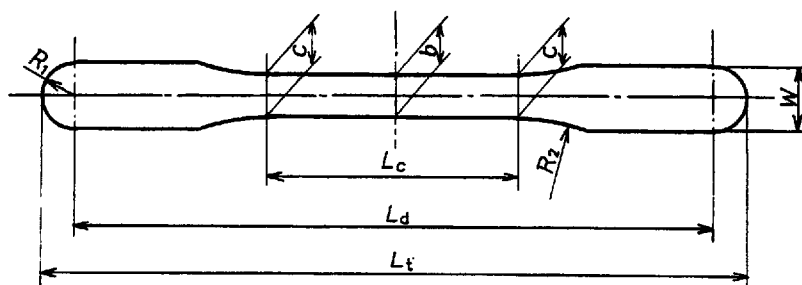
Attached Fig. 1.1 Inside shape and dimensions of die for preparation of tensile test pieces (for test pieces as pressed and sintered)

Unit : mm

b	c	L_c	L_t	W	R_1	R_2	α°
5.65 ± 0.02	5.90 ± 0.02	45.0 ± 0.05	90.0 ± 0.5	18.00 ± 0.02	2.3 ± 0.1	25.0 ± 0.1	20° $\pm 1^\circ$

Remarks 1 This table is as specified in **ISO/DIS 2740**.

2 The height of green compact is such a height as the thickness of a test piece is within 5.0 mm and 6.5 mm.



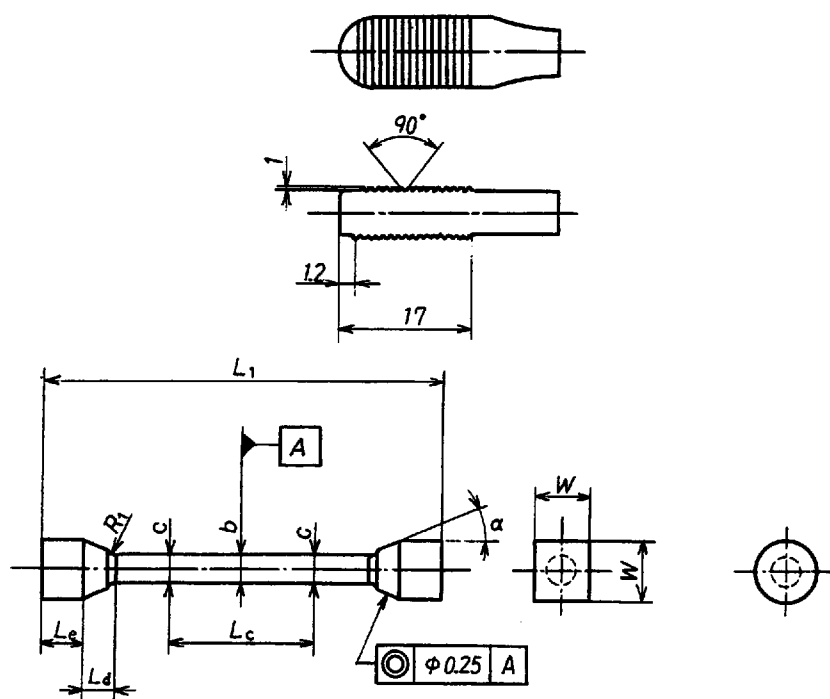
Attached Fig. 1.2 Inside shape and dimensions of die for preparation of tensile test pieces (for test pieces as pressed and sintered)

Unit: mm

	b	c	L_c	L_d	L_t	W	R_1	R_2	Pressurizing area
No. 1	5.70 ± 0.02	5.96 ± 0.02	32	87.80 0.20	96.50 0.10	8.70 0.05	4.35	25	Approx. 7 cm ²
No. 2	5.65 ± 0.02	5.90 ± 0.02	32.0 ± 0.05	81.0 ± 0.5	90.0 ± 0.5	8.70 ± 0.02	4.35 ± 0.10	25.0 ± 0.1	—

Remarks 1 No. 1 is conventionally used in Japan. No. 2 is as specified in **ISO/DIS 2740**.

2 Though the height of green compact may be 4.0 mm to 6.0 mm, when such a brace as given in the figure below is applied to the support part, it is preferable to take such a height that the thickness of the test piece is 5.0 mm to 6.5 mm.



Attached Fig. 1.3 Tensile test piece (machined test piece)