



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS Z 2501 : 2000

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

ICS 77.160

Descriptors : metals, particulate materials, sintered products, bearings, lubricating oils,
determination of content, powder metallurgy, fat content determination,
density measurement

Reference number : JIS Z 2501 : 2000 (E)

Z 2501 : 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.

By this revision, **JIS Z 2501 : 1989** *Method for determination of oil content in metal powder sintered bearing, oil impregnated*, **JIS Z 2505 : 1989** *Method for determination of density of metal powder sintered materials* and **JIS Z 2506 : 1989** *Method for determination of intercommunicating porosity of sintered metal, oil impregnated* are withdrawn, and are replaced with **JIS Z 2501 : 2000**.

Date of Establishment: 1958-07-09

Date of Revision: 2000-03-20

Date of Public Notice in Official Gazette: 2000-03-21

Investigated by: Japanese Industrial Standards Committee
Divisional Council on Non-Ferrous Metals

JIS Z 2501 : 2000, First English edition published in 2001-04

Translated and published by: Japanese Standards Association
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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Printed in Japan

Sintered metal materials— Determination of density, oil content and open porosity

Introduction This Japanese Industrial Standard has been prepared based on **ISO/DIS 2738** *Sintered metal materials—Determination of density, oil content and open porosity* published in 1996 as the third edition, without any modification in technical contents.

In this Standard the portions indicated by sidelines or dotted underlines are the matters not specified in the corresponding International Standard.

1 Scope This Japanese Industrial Standard specifies methods of determining the density, oil content and open porosity of permeable sintered metal materials.

It applies in particular to porous metal bearings and to structural parts produced by pressing and sintering metal powders.

Remarks : The International Standard corresponding to this Standard is given below.

ISO/DIS 2738 : 1996 *Sintered metal materials—Determination of density, oil content and open porosity*

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 K 0061 *Test methods for density and relative density of chemical products*

Remarks : The matters stated in **ISO 758 : 1976** *Liquid chemical products for industrial use—Determination of density at 20 °C* are equivalent to the corresponding matters in the above standard.

JIS K 2001 *Industrial liquid lubricants—ISO viscosity classification*

Remarks : **ISO 3448 : 1992** *Industrial liquid lubricants—ISO viscosity classification* is identical with the above standard.

JIS Z 8401 *Guide to the rounding of numbers*

3 Symbols and designations

Table 1 Symbols and designations

Symbol	Designation	Unit
m_1	Initial mass of the test piece	g
m_2	Mass of the test piece after oil extraction and drying	g
m_3	Mass of the fully impregnated test piece	g
m_5	Mass of the pycnometer containing the test piece and liquid	g
m_a	Mass of the fully or partially impregnated test piece plus supporting device (for example suspension wire) weighed in air	g
m_w	Mass of the fully or partially impregnated test piece plus supporting device (for example suspension wire) weighed in water	g
V	Volume of the test piece	cm ³
ρ_w	Density of the water used	g/cm ³
ρ_1	Density of the oil initially in the test piece ⁽¹⁾	g/cm ³
ρ_2	Density of the impregnating oil used ⁽¹⁾	g/cm ³

Note (1) The oil density is assumed to be known or, if not, to be determined in accordance with **JIS K 0061**.

4 Terms, definitions and test procedure

4.1 density The density of the test piece may be expressed in two ways:

4.1.1 dry density The mass, after drying, divided by the volume.

4.1.2 full impregnated density (wet density) The fully impregnated mass divided by the volume.

Remarks : The volume of impregnated test piece (total volume including pores) shall be measured by liquid substitution method.

4.2 oil content The oil content of the test piece may be expressed in two ways:

4.2.1 percentage by volume The volume of the oil divided by the volume of the test piece and multiplied by 100.

4.2.2 percentage of the volume of the open porosity The volume of the oil divided by the volume of the open porosity and multiplied by 100.

4.3 open porosity (of the test piece) The oil content after full impregnation divided by the volume of the test piece and multiplied by 100 expressed as a percentage by volume.

4.4 volume (of the test piece) Total volume including the pores which is determined from the mass in air and the mass in liquid whose density is known. It is obtained by dividing the difference between the two masses by the density of the liquid.

4.5 Test procedures Depending upon which of the properties is to be determined, some or all of the test procedures in clause 7 are carried out. Table 2 shows the test procedures that are carried out for the property to be determined. The values obtained for the various parameters are inserted in the respective formulae given in clause 8 to obtain the desired property.