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**Tungsten powder and
tungsten carbide powder**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by the Japan Tungsten & Molybdenum Industries Association (JTMIA)/ the Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS H 2116 : 1995** is replaced with this Standard.

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Tungsten powder and tungsten carbide powder

1 Scope This Japanese Industrial Standard specifies tungsten powder and tungsten carbide powder to be used for powder metallurgy products such as cemented carbide, electrical contacts, metallized products and other products.

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 (including amendments) indicated below shall be applied.

JIS H 1402 *Methods for chemical analysis of tungsten powder and tungsten carbide powder*

JIS P 3801 *Filter paper (for chemical analysis)*

JIS Z 8401 *Guide to the rounding of numbers*

3 Classification Tungsten powder and tungsten carbide powder shall be classified into two types; type 1 and type 2 according to the chemical composition.

4 Quality

4.1 Appearance Tungsten powder and tungsten carbide powder shall be uniform in quality and free from discolouration or intermixing of foreign matters.

4.2 Chemical composition The chemical composition of tungsten powder and tungsten carbide powder shall be in accordance with 4.2.1 and 4.2.2.

Furthermore, the marking method shall be method A for indication of elements and method B for indication of non-volatile matter.

4.2.1 Chemical composition of tungsten powder The chemical composition of tungsten powder shall be in accordance with either table 1 or table 2.

a) Method A

Table 1 Chemical composition of tungsten powder

Classification	Chemical composition						
	W ⁽¹⁾ %	Fe ppm	Mo ppm	Ca ⁽²⁾ ppm	Si ⁽²⁾ ppm	Al ⁽²⁾ ppm	Mg ⁽²⁾ ppm
Type 1	99.9 min.	200 max.	200 max.	30 max.	30 max.	20 max.	10 max.
Type 2	99.0 min.	3 000 max.	5 000 max.	300 max.	300 max.	200 max.	100 max.

Notes (1) The purity (W) of tungsten shall be the remainder after subtracting the total contents in percentages of iron, molybdenum, calcium, silicon, aluminum and magnesium from 100 % and two decimal places and lower shall be rounded down.

- (2) The total contents of calcium, silicon, aluminium and magnesium shall be not more than 40 ppm for type 1 and not more than 400 ppm for type 2.

b) **Method B**

Table 2 Chemical composition of tungsten powder

Classifi- cation	Chemical composition			
	W ⁽³⁾ %	Fe ppm	Mo ppm	Non-volatile matter %
Type 1	99.9 min.	200 max.	200 max.	0.01 max.
Type 2	99.0 min.	3 000 max.	5 000 max.	0.10 max.

Note (3) The purity (W) of tungsten shall be the value after subtracting each calculated value of content in percentages of iron, molybdenum and non-volatile matter from 100 % and two decimal places and lower shall be rounded down.

4.2.2 Chemical composition of tungsten carbide powder The chemical composition of tungsten carbide powder shall be in accordance with either table 3 or table 4.

a) **Method A**

Table 3 Chemical composition of tungsten carbide powder

Classifi- cation	Chemical composition									
	WC ⁽⁴⁾ %	Total carbon %	Free carbon %	Combined carbon %	Fe ppm	Mo ppm	Ca ⁽⁵⁾ ppm	Si ⁽⁵⁾ ppm	Al ⁽⁵⁾ ppm	Mg ⁽⁵⁾ ppm
Type 1	99.8 min.	6.13 ⁽⁶⁾ ± 0.05	0.10 max. ⁽⁶⁾	6.05 min.	300 max.	200 max.	30 max.	30 max.	20 max.	10 max.
Type 2	98.5 min.	6.13 ⁽⁶⁾ ± 0.15	0.20 max.	5.95 min.	3 000 max.	5 000 max.	750 max.	750 max.	500 max.	250 max.

Notes (4) The purity (WC) of tungsten carbide powder shall be the remainder after subtracting the contents in percentages of free carbon, iron, molybdenum, calcium, silicon, aluminium and magnesium from 100 % and two decimal places and lower shall be rounded down.

(5) The total contents of calcium, silicon, aluminium and magnesium shall be not more than 80 ppm for type 1 and not more than 2 000 ppm for type 2.

(6) The medium of total carbon for type 1 may be varied within the range 6.13 % or over up to and including 6.35 % upon the agreement between the parties concerned with delivery. In such cases, the free carbon shall meet the following requirement.

$$\text{Free carbon (\%)} \leq (\text{varied median}) - 6.13 + 0.10$$

In the case mentioned above, the purity of tungsten carbide powder shall be not less than 99.5 %.

b) **Method B****Table 4 Chemical composition of tungsten carbide powder**

Classification	Chemical composition					
	WC ⁽⁷⁾ %	Total carbon %	Free carbon %	Fe ppm	Mo ppm	Non-volatile matter %
Type 1	99.8 min.	6.13 ⁽⁶⁾ ± 0.05	0.10 max. ⁽⁶⁾	300 max.	200 max.	0.02 max.
Type 2	98.5 min.	6.13 ⁽⁶⁾ ± 0.15	0.20 max.	3 000 max.	5 000 max.	0.50 max.

Note (7) The purity (WC) of tungsten carbide powder shall be the value after subtracting each calculated value of content in percentages of free carbon, iron, molybdenum and non-volatile matter from 100 % and two decimal places and lower shall be rounded down.

4.3 Particle size The particle size of tungsten powder shall be 0.5 µm to 16.0 µm, and the particle size of tungsten carbide powder shall be 0.5 µm to 12.0 µm.

4.4 Oxygen content The oxygen content of tungsten powder shall conform to table 5 according to the type and particle size.

Table 5 Oxygen content

Classification	Particle size µm	Oxygen %
Type 1	0.5 or over to and excl. 1.0	0.50 max.
	1.0 or over to and excl. 1.5	0.40 max.
	1.5 or over to and excl. 2.0	0.30 max.
	2.0 or over up to and incl. 16.0	0.10 max.
Type 2	0.5 or over to and excl. 1.0	1.00 max.
	1.0 or over up to and incl. 16.0	0.50 max.

5 Sampling method The sampling method and handling method shall be in accordance with **JIS H 1402**.

6 Test method

6.1 Method for rounding-off of numeral values The method for rounding-off of numeral values shall be in accordance with **JIS Z 8401**.

6.2 Appearance test The appearance test shall be carried out visually.

6.3 Chemical analysis test The chemical analysis test shall be in accordance with **JIS H 1402**.