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**General rules for test of tungsten
and molybdenum materials for
lighting and electronic equipments**

ICS 29.140.99; 31.220.99; 77.120.99

Reference number : JIS H 4460 : 2002 (E)

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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 4460** : 1994 is replaced with this Standard.

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In the event of any doubts arising as to the contents,
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General rules for test of tungsten and molybdenum materials for lighting and electronic equipments

1 Scope This Japanese Industrial Standard specifies general rules for test of tungsten, thoriated tungsten and molybdenum wires and rods (hereafter referred to as “wires” and “rods”) and sheets and foils of molybdenum (hereafter referred to as “sheets” and “foils”).

Further, applicable materials for the test shall be as given in Table 1.

Table 1 Applicable materials

Tests	Applicable materials
Appearance test	Wires and rods, sheets and foils
Chemical analysis test	Wires and rods, sheets and foils
Heating deformation test	Tungsten wires or thoriated tungsten wires
Recrystallization temperature measuring method	Tungsten wires
Tensile test	Tungsten or molybdenum wires or rods, sheets or foils
Hardness test	Sheets and foils
Bend test	Sheets and foils
Erichsen test	Sheets and foils
Winding test	Tungsten wires or thoriated tungsten wires
Heating brittleness test	Tungsten wires and molybdenum wires
Folding test	Dope molybdenum wires or dope molybdenum rods
Straightness test	Wires and rods
Flatness	Sheets and foils

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

JIS B 7721 *Verification of the force measuring system of the tensile testing machine*

JIS B 7729 *Erichsen cupping testers*

JIS B 7741 *Verification of extensometers used in uniaxial testing*

JIS H 0321 *General rules for inspection of non-ferrous metal materials*

JIS H 1403 *Methods for chemical analysis of tungsten materials*

JIS H 1404 *Methods for chemical analysis of molybdenum materials*

JIS H 1405 *Methods for chemical analysis of thoriated tungsten materials*

- JIS Z 2201 *Test pieces for tensile test for metallic materials*
JIS Z 2204 *Bend test pieces for metallic materials*
JIS Z 2241 *Method of tensile test for metallic materials*
JIS Z 2244 *Vickers hardness test—Test method*
JIS Z 2247 *Method of Erichsen cupping test*
JIS Z 2248 *Method of bend test for metallic materials*

3 Definitions Definitions for principal terms used in this Standard shall be as follows.

- a) **classification between wires and rods** Wires and rods are not classified by diameter. Those wound on a reel or the like and those bundled in a hoop state are generally called wires. Those not wound are called rods.
- b) **classification between sheets and foils** Sheets and foils are classified by thickness. Those having the thickness of ≥ 0.1 mm are called sheets and the thickness of < 0.1 mm are called foils.
- c) **lot** That processed from blended powder in one time is called a lot.
- d) **thickness** The thickness of wires or rods is represented by diameter (mm). However, the thickness of wires may be represented by MG⁽¹⁾ as occasion demands.

Note ⁽¹⁾ MG is a numerical value representing in milligrams the mass of a wire of 200 mm in length.

$$MG = K \times D^2$$

where, D : diameter of wire (mm)

K : a constant, 3 016 for tungsten and thoriated tungsten and 1 600 for molybdenum.

- e) **average value of thickness** Thicknesses of both ends of a wire or a rod are measured at two or more positions to be represented by its arithmetic mean.
- f) **tolerance on thickness** The range of the average value of thickness allowable for the same kind.
- g) **difference of thickness** The difference between thicknesses at both ends of a wire or a rod, represented by the following formula.

$$T = \frac{\frac{A - B}{A + B}}{2} \times 100$$

where, T : difference of thickness (%)

A : maximum thickness measured at both ends (mm or MG)

B : minimum thickness measured at both ends (mm or MG)