

# Technical Information Bulletin

## Large Diameter Tungsten Rod (0.625" to 2.000" diameter) (15.8mm to 51mm diameter)

### Description

SYLVANIA Large Diameter Tungsten Rod is manufactured by powder-metallurgical techniques. Hydrogen-reduced tungsten powder, produced by Sylvania to rigidly controlled purity, particle size, and size distribution is consolidated by pressing and sintering into billets, which are worked by rolling and/or swaging into rod. Large Diameter

Tungsten rod is furnished in straight random lengths with an as swaged, as machined, or as centerless ground surface at diameters from 0.625" to 2.000". Maximum length/weight is 8 foot or 50KG. Specific lengths and special fabrications, such as beveling, pointing, and step grinding will be supplied upon request. Sylvania also offers tungsten rod in

diameters less than 0.625" in the following types of material: pure tungsten, potassium doped (VM grade) tungsten, 1.3% La tungsten, 1 and 2% Th tungsten, potassium doped 1 and 2% Th tungsten and lighting grade potassium doped tungsten. For information on tungsten rod sizes less than 0.625" diameter, see SYLVANIA's TIB "Tungsten Rod (<0.625" diameter).

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### Types of Material

#### **PURE TUNGSTEN**

Pure tungsten rod is 99.95% pure tungsten with a fine-grained worked structure. The material is used for high-temperature furnace elements and as feed for subsequent operations such as machining, forging, or extrusion.

#### **POTASSIUM DOPED TUNGSTEN (VM GRADE)**

Potassium doped (VM grade) tungsten rod is 99.95% pure tungsten doped with 15 to 40 ppm of potassium with a fine-grained worked structure. The material's main applications are as HID lighting electrodes and as feed for subsequent operations such as machining, forging, or extrusion.

#### **TUNGSTEN LANTHANA (1.3% La<sub>2</sub>O<sub>3</sub>)**

Tungsten 1.3% lanthana rod contains 1.1% to 1.6% lanthana (La<sub>2</sub>O<sub>3</sub>). It is an alloy of 98.7% pure tungsten with 1.1% lanthanum (1.3% lanthana) with a fine-grained worked structure. The material's main applications are as rocket nozzles and as feed for subsequent operations such as machining, forging, or extrusion.

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## Types of Surface Finish

### **As Swaged and Cleaned**

This surface has a gray, matte finish with some minor surface irregularities due to oxidation during processing. Cleaned finish designates a chemically cleaned surface.

### **As Centerless Ground**

This designates a centerless-ground finish that ensures uniformity of size to close tolerances. Centerless ground-finish rod is supplied with a bright, polished surface. A ground-etched finish is also available on special request.

### **As Machined**

This finish is a bright surface typical of machined parts. Special surface roughness requirements must be specified.

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## Types of Material Condition

### **As Stress Relieved**

The rod is in the as worked and stress relieved condition. A post metalworking heat treatment has been applied to remove residual stresses from the working operations. This heat treatment is necessary to allow the rod to be cut, machined, or worked further.

### **As Recrystallized**

The rod is in the as worked and recrystallized condition. Recrystallization returns the rod to its original microstructural state. A post metalworking heat treatment has been applied to totally remove all effects of metalworking.

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## Other Considerations

Density may be a critical element for consideration by the customer. Generally, the greater the Reduction In Area % (%RIA) the greater the theoretical density. At 75% reduction in area, typical density is 99% or greater with a minimum density of 98%.

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<u>Clean-up Tolerance &amp; Straightness</u>	Finish	Clean-up Tolerance (inches)	Straightness
	As Swaged & Cleaned	0.075" *	Maximum of 0.015" per foot of length

\* Note: This is the amount of material that must be removed from the rod's diameter to have a totally uniform surface. For example, if you are going to machine to 1.750" diameter, you should order as "ROTF" (Rough Oversize To Finish) to 1.750" diameter. OSRAM SYLVANIA will supply a 1.825" diameter rod.

<u>Diameter Tolerance</u>	Diameter Range (inches)	Swaged and Cleaned Finish*	Centerless Ground Finish*	Machined Finish*
(by diameter range and finish)	0.625 to 0.749	± 0.008"	± 0.003"	*
	0.750 to 0.999	± 0.010"	± 0.005"	*
	1.000 to 1.749	± 0.015"	± 0.008"	± 0.005"
	1.750 to 2.000	± 0.030"	± 0.010"	± 0.005"

\* Note: Tolerances shown are standard and apply to all types of metal and finishes within the available diameter ranges.  
Tighter tolerances are available on special request.

<u>Length Tolerance</u>	Diameter (inches)	Minimum Length* (Feet)	Maximum Length* (Feet)	Length Tolerance (inches)
(when ordered in random lengths)	0.625 to 0.749	± 0.008"	± 0.003"	*
	0.750 to 0.999	± 0.010"	± 0.005"	*
	1.000 to 1.749	± 0.015"	± 0.008"	± 0.005"
	1.750 to 2.000	± 0.030"	± 0.010"	± 0.005"

\* Note: The two criteria for length is that the rod cannot be longer than 8 feet and cannot weigh more than 50kg.

### Fabricated Parts

Sylvania can fabricate many special parts to customers' specifications. These include specific length cut pieces and special shapes produced by chamfering, beveling, step-grinding, and slotting. Requests for special work should be accompanied by a sketch of the part showing dimensions and tolerances required.

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## How to Order

Specify:

1. Type of material
2. Finish
3. Material condition
4. Diameter and tolerance
5. Length tolerance
6. Number of kilograms
7. Application
8. A copy of any print and/or any other specification

For example:

Pure tungsten rod  
As swaged and clean finish  
Stress relieved condition  
ROTF to 1.500" diameter  
100 kilograms, random lengths of 2 feet minimum  
Application: use as high temperature (1650°C max) furnace element  
See attached print

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## Packaging

Tungsten rod is securely tied and packed in wooden boxes constructed for the particular shipment. A commercial desiccant is used as a filler. Special packaging is available upon request.

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