

Refractory Metals – Wire & Rod

Global Tungsten & Powders Tungsten Wire is available in selected combinations of three types and thirteen process variations in diameters from 0.3 to 65 mils (0.008 to 1.65 mm) either on returnable containers or as self-coils, depending on the diameter.

Generally, tungsten wire is made from doped powders, that is, powders in which small quantities of potassium, silicon, and aluminum have been incorporated. Their purpose is to influence the recrystallized grain structure to reduce the creep rate at the high temperatures of incandescent filaments. The powders are consolidated under high pressure, sintered at high temperatures and worked by rolling and swaging to heavy rod suitable for drawing.

Tungsten wire drawing is accomplished by coating the wire with a graphite lubricant, heating to a red heat, and then drawing through tungsten carbide or diamond dies. The process is sometimes referred to as hot cold-working, which means that, while the wire is hot, the temperature is still below the recrystallization range. Accordingly, as the cross-sectional area is reduced, strength and ductility increase. The as-drawn wire at finished size subsequently may be cleaned, straightened, or annealed. Through various drawing methods and annealing steps, Global Tungsten & Powders produces different physical characteristics in wire of a given size. Our control of each manufacturing step from tungsten ore to finished wire assures reliability and reproducibility.

Applications

Global Tungsten & Powders is a leading manufacturer of tungsten wire used in a broad range of applications in the lamp, electronic-tube, photocopy, computer, vacuum-metallizing, and electric-furnace industries, and in the making of fiber-reinforced materials.

Wire types can be divided into two groups based on diameter:

Group I – Available in Ultrafine Through Heavy Sizes (<0.020”)

NS / HG

AKS-doped high-purity nonsag tungsten suitable for coiled filaments and supports in all incandescent, infrared, and high-temperature halogen lamps. Also used for electronic tube and heater applications as well as electric-furnace elements. It is available in the broadest range of standard process for the widest variety of applications.

3RW

Wire containing 3.25% rhenium. This raises the recrystallization temperature, inhibiting recrystallization during use. Wire remains ductile, making it appropriate for lamps subject to shock or vibration, such as sign lamps.

1TH

Wire containing 1% thoria. Its principal use is for power-tube filaments and for some types of incandescent lamps for vibration service.

Group II – Available at and above 0.51mm (0.020”)

PW

Undoped high purity wire for lamp coils in which sag is not important, as in supported coils. The recrystallization temperature is lower than that of NS, and it is less resistant to sag at high temperatures.

VM

Wire furnished in either stranded or single-wire form for vacuum metallizing. The wire should also be specified for other applications requiring maximum ductility, but less-critical nonsag characteristics.

2TH

Wire containing 2% thoria for applications requiring high electron emission, such as for arc lamp electrode and power tubes.

Tungsten Rod

Global Tungsten & Powders Tungsten Rod is manufactured by powder-metallurgical techniques. Hydrogen-reduced tungsten powder, produced by Global Tungsten & Powders to rigidly controlled purity, particle size, and size distribution is consolidated by pressing and sintering into billets, which are worked by rolling or swaging into rod. Smaller sizes are produced by subsequent drawing. The rod is furnished in straight random lengths with a smooth swaged surface at diameters 0.119" to 0.625" and with a smooth drawn finish below 0.119". A centerless-ground finish can also be furnished. Specific lengths and special fabrication, such as beveling, pointing, and step grinding will be supplied upon request.

Global Tungsten & Powders also offers Large Diameter Tungsten Rod available with a diameter range of 0.625" to 2.000" in the following types of materials: pure tungsten, potassium doped tungsten (VM grade) and tungsten lanthana.

For further information on large diameter tungsten rod, see **Global Tungsten & Powders's** Technical Information Bulletin on Large Diameter Tungsten Rod (0.625" to 2.000").

Applications

Pure Tungsten

Fine-grain tungsten rod is 99.9% pure tungsten with a fine-grained worked structure. The material has wide general usage for automotive ignition contacts, heaters and supporting members in electronic tubes, mercury-switch contacts, hard-glass leads, and high-temperature furnace elements.

1%-Thoriated Tungsten Rod

Contains 0.8 to 1.2% thoria. Its principal use is for power-tube emission filaments and for electrodes for TIG welding.

2%-Thoriated Tungsten Rod

Contains 1.7 to 2.3% thoria. Its principal use is in TIG welding electrodes.

1 & 2% Thoriated Potassium Doped (VM Grade) Tungsten Rod

Contains 15 to 45 ppm potassium. Its principal use is in the lighting industry, particularly as cathode material in high intensity lamp applications.

Potassium doped tungsten rod (VM grade, J)

Contains 15 to 45 ppm potassium. Its principal use is in the lighting industry, particularly as anode material in high intensity lamp applications.



Potassium doped tungsten rod (lighting grade, NS, AK) Contains 50 to 70 ppm potassium.

Tungsten 1.3% Lanthana Rod

Contains 1.1% to 1.6% lanthana (La_2O_3). It is an alloy of 98.7% pure tungsten with 1.1% lanthanum (1.3% lanthana) with a fine-grained worked structure.

NOTE: Global Tungsten & Powders tungsten inert-arc-welding electrodes are stocked and sold through all leading welding distributors. For information contact your local Global Tungsten & Powders Welding Distributor.



Molybdenum Wire

Global Tungsten & Powders is a leading manufacturer of molybdenum wire. Our wire is available in selected combinations of five types and thirteen process variations in diameters from 1.0 to 250 mils (0.0254 to 6.35 mm) either in returnable containers or as self coils, depending on the diameter.

Applications

Global Tungsten & Powders 's Molybdenum wire is used in a broad range of applications by many industries. Mandrels for making tungsten filaments along with leads, filament supports, and seals are among the applications in the lighting industry.

Other applications include: grid wire for electronic tubes; heating elements for electric furnaces; spray metallizing wire for the hardsurfacing of automotive components; electrode wire for the traveling-wire electrical-discharge-machining process (EDM).



Molybdenum Rod

Molybdenum rod is produced at Global Tungsten & Powders using a powder-metallurgical process, which yields rods achieving near-100% theoretical density. Our process yields high-strength rods for applications where structural integrity is critical, but can also be tailored to produce rods optimized for machinability.

Please contact us with your specific dimensional and mechanical property needs.