



TUNGSTIT® W Cu/Ag alloys. Maximum quality and durability.

The strengths – for your applications

- 1 Excellent process quality - improved material properties
- 2 Excellent erosion resistance - longer lifetimes
- 3 Excellent processing quality - maximum reproducibility
- 4 Excellent edge stability - high deformation resistance
- 5 Outstanding homogeneity - clean application processes

TUNGSTIT®

Your benefits at a glance.

TUNGSTIT® is the trademark name for tungsten-copper and tungsten-silver alloys made by powder metallurgy produced by Wolfram Industrie. The exceptional properties of these alloys are the result of the comprehensive material expertise and application experience that have gone into continuously improving material properties and associated infiltration and sintering processes over decades.

TUNGSTIT® is primarily used for the manufacturing of electrodes for EDM, resistance welding and for producing contact materials. The use of silver, instead of copper, is particularly suitable for applications in which high corrosion and oxidation resistance is needed in addition to pre-existing requirements. Moreover, the electrical and thermal conductivity of silver is higher than that of copper.

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TUNGSTIT®

Tungsten Copper/Silver Alloys.

Tungsten-copper and tungsten-silver alloys are the preferred active agent combinations for EDM with minimal wear and high process quality, for spot welding or for contact manufacturing. The strengths of tungsten-copper (WCu) and tungsten-silver (WAg) lie in combining the exceptional qualities of existing elements in a single material. Tungsten is distinguished by its extreme hardness, solidity and rigidity. The element also possesses the highest melting point among all metals (3,420° C) and a correspondingly high thermal stability. Com-

bined with the exceptional electrical and thermal conductivity of copper and silver, it offers the optimal conditions for numerous application areas.

As an alloy, tungsten-copper/silver is a heterogeneous alloy. It arises from pressing and sintering tungsten powder. The pores remain open before being impregnated with liquid copper or silver. This allows for varying proportions of the respective materials to be determined depending on the process quality.

Excellent process quality – improved material properties.



Wolfram Industrie's excellent process quality begins as early as the highly selective choice of tungsten powder and is reflected one to one in the material quality and the product made with it. TUNGSTIT® optimally combines the special properties of tungsten and copper or silver for the specific application. The high hardness and rigidity in

combination with high thermal stability (tungsten), as well as high electrical and thermal conductivity (copper or silver) has been optimised even further by the special process quality employed by Wolfram Industrie. This includes increasing the alloy tensile strength from 500–600 MPa to values up to 800 MPa.

Excellent erosion resistance – longer lifetimes.



TUNGSTIT® boasts excellent erosion resistance and longer lifetimes. Due to their long-term use at extreme temperatures, electrodes can only guarantee a consistently high processing quality over a certain period of use. Crucial here is how long or how often they can be used until 'burnout'. The alloy's high thermal stability and an extremely high

melting point ensure that signs of wear are markedly lower than when using copper or graphite electrodes.

Wolfram Industrie can specially optimise the tungsten content in the metal alloy for its respective application so that erosion resistance increases in comparison to competitors' products.



Excellent processing quality – maximum reproducibility .



TUNGSTIT® provides increased processing quality independent of the respective application area. This is not only reflected in the excellent wear values and long lifespans, but in the quality of the resulting products too. The high structural integrity of TUNGSTIT® provides the foundation for the

highly precise application of electric arcs and is reflected in the equally high fidelity and manufacturing quality of the end product. Time and costs can be saved by removing the need for post-processing and maximum reproducibility of manufactured parts (EDM) is achieved.

Outstanding homogeneity.



An additional quality characteristic TUNGSTIT® over competitor products is the homogeneity of produced materials. This quality characteristic is both immediately and later apparent in all application areas of tungsten-copper/silver alloys. Among other things, it ensures that strong pressure can be counteracted by a consistently high resistance and thus high quality and service life are maintained even under punctual stresses.

Clean application processes.



Working with TUNGSTIT® is 'clean' work. There are no contaminants resulting from waste matter – with the exception of spent electrodes or contacts requiring disposal. High levels of dust, for example as a result of EDM with graphite electrodes, does not exist when using TUNGSTIT®.

Accordingly, no additional equipment for air pollution control or dust extraction must be purchased.

High deformation resistance.



Similar to edge stability, the hardness and strength of TUNGSTIT® provide very high deformation resistance. This prevents compression deformation when using the electrode for processing hard metals. In addition, tungsten-copper/silver alloys do not break under pressure.

Excellent edge stability.



Particularly in the case of EDM, the high edge stability of TUNGSTIT® is another positive service life feature. Here, the extreme hardness and strength of the tungsten content ensure that the electrode material loses its shape only very slowly, even when processing large quantities, and therefore seldom needs to be replaced.

	Technical data: Tungsten-copper / Sintered materials						
	Kenndaten: Wolfram-Kupfer / Sinterwerkstoffe						
	T 50	T 60	T 70	T 75	T 80	T 85	T 90
Composition [%] <i>Zusammensetzung</i>	W: 50 ± 3 Cu: 50 ± 3 Ni: ≤ 0,5	W: 60 ± 3 Cu: 40 ± 3 Ni: ≤ 0,5	W: 70 ± 3 Cu: 30 ± 3 Ni: ≤ 0,5	W: 75 ± 3 Cu: 25 ± 3 Ni: ≤ 0,5	W: 80 ± 3 Cu: 20 ± 3 Ni: ≤ 0,5	W: 85 ± 3 Cu: 15 ± 3 Ni: ≤ 0,5	W: 90 ± 3 Cu: 10 ± 3 Ni: ≤ 0,5
Density [g/cm³] <i>Dichte</i>	12.1 ± 0,3	13.1 ± 0,3	14.3 ± 0,3	14.9 ± 0,3	15.6 ± 0,3	16.3 ± 0,3	17.2 ± 0,4
Hardness [HV10] <i>Härte</i>	150 - 200	170 - 210	180 - 220	190 - 240	210 - 260	230 - 280	250 - 290
Tensile strength [MPa] <i>Zugfestigkeit</i>	-	-	520 - 610	590 - 710	600 - 750	620 - 780	680 - 820
Modulus of elasticity [GPa] <i>Elastizitätsmodul</i>	-	-	210 - 230	220 - 240	230 - 250	250 - 300	280 - 300
Electrical conductivity [10⁶ S/m] <i>Elektrische Leitfähigkeit</i>	28 - 35	23 - 28	20 - 24	19 - 24	18 - 23	18 - 22	18 - 22
Electrical conductivity [W/(m·K)] <i>Wärmeleitfähigkeit</i>	-	-	170 - 200	160 - 190	150 - 180	140 - 170	140 - 170

	Technical data: Tungsten-silver / Sintered materials				
	Kenndaten: Wolfram-Silber / Sinterwerkstoffe				
	T 50 S	T 60 S	T 70 S	T 75 S	T 80 S
Composition [%] <i>Zusammensetzung</i>	W: 50 ± 3 Ag: 50 ± 3 Ni: ≤ 0,5	W: 60 ± 3 Ag: 40 ± 3 Ni: ≤ 0,5	W: 70 ± 3 Ag: 30 ± 3 Ni: ≤ 0,5	W: 75 ± 3 Ag: 25 ± 3 Ni: ≤ 0,5	W: 80 ± 3 Ag: 20 ± 3 Ni: ≤ 0,5
Density [g/cm³] <i>Dichte</i>	min. 12,7	min. 13,6	min. 14,7	min. 15,0	min. 15,7
Hardness [HV10] <i>Härte</i>	100 ± 20	120 ± 20	145 ± 20	165 ± 20	190 ± 20
Electrical conductivity [10⁶ S/m] <i>Elektrische Leitfähigkeit</i>	29 - 38	24 - 28	22 - 26	21 - 25	20 - 24

TUNGSTIT®

The specific applications in detail.

EDM.

The special material properties make TUNGSTIT® electrodes particularly suitable for processing extremely hard materials such as carbide or titanium. They are particularly in demand for this capability when it comes to the use of EDM, which can be used to process such hard materials consistently and efficiently. In this function they are in great demand, for example, for applications in the tool and

mechanical engineering industries. The best conditions are created by an optimal combination of the materials tungsten and copper or silver. Tungsten stands for outstanding mechanical properties such as minimal wear, edge sharpness and high deformation resistance. On the other hand, copper or silver provide the necessary conductivity.

Resistance welding.

Resistance welding or resistance spot welding processes are mainly used in the car, aerospace and other sheet metal processing industries. In this case, current is supplied to the point locations via the electrode insert. The sheets are spot welded together at very high temperatures. Tungsten-copper and tungsten-silver alloy electrodes are particularly suitable for this because they combine the specific properties of copper or silver (electrical and thermal conductivity) and tungsten (high strength and heat resistance).

Due to the exceptional homogeneity of the composites, the use of TUNGSTIT® maximizes the quality of the welding processes and ensures long lifespan and best reproducibility values. In particular, the mechanical properties of tungsten-copper and tungsten-silver alloys, such as tensile strength or elongation at break, are required for use in resistance spot welding. In this respect, the tungsten content in the composite tends to be higher than when used as a material for contact materials.

Use as a contact material.

The efficiency of switches depends directly on the quality of the contact materials. This is reflected in their conductivity in closed circuits, but above all in their robustness, which permits frequencies of up to one million switching operations. The wear of a contact arises mainly from the thermal load during the switching process.

The use of tungsten in the composite material ensures maximum burn-off resistance and minimum

wear values. Here, too, tungsten demonstrates excellent mechanical properties, while copper and silver together ensure the necessarily high electrical and thermal conductivity that tends to dominate here. Wear becomes noticeable with increasing stress due to copper and silver depletion at the contact surface. The high quality of TUNGSTIT® materials is particularly evident in the high degree of deceleration of these processes.

TUNGSTIT®

Supply formats.

TUNGSTIT® is manufactured in all standard shapes and sizes, in different material compositions, but also – for correspondingly high quantities – according to individual specifications.

Composition: standard or customised

TUNGSTIT® is supplied as standard in the variants T50, T70, T75, T80 and T90 for copper and up to T85 for silver. The number represents the respective tungsten content in the alloy. In addition to these standard requirements, Wolfram Industrie is able to produce any desired composition.

Different forms of semi-finished products

TUNGSTIT® is supplied as semi-finished products in a variety of forms: rods, bars, blocks, blanks and plates.

Customised solutions required?

Our tip: Special dimensions and electrodes based on drawings are available on request.

	Product overview Produktüberblick						
	T 50	T 60	T 70	T 75	T 80	T 85	T 90
Copper <i>Kupfer</i>	+	+	+	+	+	+	+
Silver <i>Silber</i>	+	+	+	+	+	0	0
Solutions <i>Lösungen</i>	Rods, bars, blocks, blanks or plates <i>Stäbe, Stangen, Blöcke, Ronden oder Platten</i>						

	Sizes Abmessungen	
Circular blanks <i>Ronden</i>	from / ab: Ø 40 x 40 mm	to / bis: Ø 100 x 60 mm
Square bars <i>Quadratische Stäbe</i>	from / ab: 5 x 5 x 300 mm	to / bis: 40 x 40 x 300 mm
Rectangular bars <i>Rechteckige Stäbe</i>	from / ab: 6 x 5 x 300 mm	to / bis: 40 x 35 x 300 mm
Turned rods <i>Rundstäbe</i>	Ø (3.0 - 50.0) x (200 / 300) mm	
Plates <i>Platten</i>	75 x (2 / 5 / 10 / 15 / 20 / 25) x 200 mm	



TUNGSTIT®

Save money and time, increase quality.

Take advantage of our quality consulting!

The different application methods, in combination with the different materials that are processed or manufactured, form a very specific requirement profile. In order to guarantee the best possible variant with uniformly high and the best possible

long-term processing quality for every application, we also offer TUNGSTIT® customised specifications in addition to our standard specifications. Take advantage of our expertise and save time and costs by consulting us!

TUNGSTIT® Seal of Quality.

Wolfram Industrie is a specialist in the manufacture and processing of tungsten and molybdenum materials. We guarantee our customers that all production steps – from selecting the powder to delivering the final product – are carried out in our own factory.



Further information and instructions for safe handling can be found on our website.

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