

Data Sheet

Tungsten-Copper (WCu) [also: Copper-Tungsten CuW]



Tungsten-Copper (WCu) is a composite material with a heterogeneous structure. Typically, a porous blank is produced by pressing and sintering tungsten powder. The remaining pores are sealed by immersing in liquid copper (=infiltration). Furthermore, the production of WCu can also be carried out by means of liquid-phase sintering. Depending on the grain size of the W-powder as well as pressing and sintering parameters, various contents of Tungsten respectively Copper can be selected. Tungsten-Copper combines many typical characteristics of the single elements Tungsten and Copper as for example the hardness, wear and burn-off resistance of Tungsten together with the good electrical and thermal conductivity of Copper.

Tungsten-Copper is used for example for eroding electrodes (EDM), heat sinks, electrical contacts, medium and high voltage breakers (SF₆), welding electrodes (contact / resistance welding), balancing weights and others. Tungsten-Copper is frequently used as an electrode material, in case that the typical copper contact materials (e.g. Copper-Chrome-Zirconium CuCrZr and others) have reached their limits.

Significant Characteristics and Applications

- | Good machinability
- | High density
- | Very good dimensional stability
- | Low coefficient of expansion
- | High surface quality
- | High wear resistance
- | High thermal conductivity
- | High burn-off resistance

Machining

The machining is carried out by carbide tools. The properties when machining are very good. Compared to various Copper alloys there are no deformations due to the high hardness and high E-Modulus. A very good surface quality can be achieved with almost burr- and nick-free edges.

ASTM Standard Specification

ASTM B702 (Copper-Tungsten Electrical Contact Material)

Properties of the most important material types

	Tungsten-Copper WCu					
	50/50 Class A	60/40 Class B	70/30 Class C	75/25 Class D	80/20 Class E	90/10 —
Chemical Composition						
Copper (Cu) [%]	50±2	40±2	30±2	25±2	20±2	10±2
Tungsten (W) [%]	Rest	Rest	Rest	Rest	Rest	Rest
Additives [max. %]	1	1	1	1	1	1
Physical Properties						
Density [g/cm ³]	11.7	12.7	13.7	14.3	15.0	16.5
Electrical Conductivity [% IACS]*	56-64	49-57	44-52	41-48	38-45	<30
Coefficient of Thermal Expansion [10 ⁻⁶ K ⁻¹]	13.0	11.9	10.3	9.5	8.8	<7.5
Thermal Conductivity [W/m · K ⁻¹]	—	—	200	190	180	170
Mechanical Properties						
Hardness [HRB]	69-83	77-90	85-98	89-102	94-106	—
E-Modulus [GPa]	—	—	220	260	280	290
Tensile Strength R _m [MPa]	344-413	379-448	516-585	585-654	620-689	700

Typical values, partly standardised according to ASTM B702

* International Annealed Copper Standard, 100 % IACS is equivalent to 58 MS/m

Range of Products

Rods, squares, plates, foils and sheets, small tubes, contacts and finished parts according to drawings.