

Short Name		Chemical Composition	W
Code	Tungsten	Reference values (%)	min. 99,95 %
Material-N°. (alt)	-		

Material-Properties	Tungsten is hard and brittle, his corrosion resistance to many acids is excellent. The machinability is very difficult. High hardness under elevated temperatures, highest melting point of all metals, high effect against radiation.
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Applications	<ul style="list-style-type: none"> • Heating elements, heat shields and parts in vacuum- and protective gas furnaces • Filaments and boats for the evaporation technique • Tungsten electrodes for TIG-welding • Radiation shields for x-ray technique • Stationary and rotating cathodes and anodes of x-ray valves
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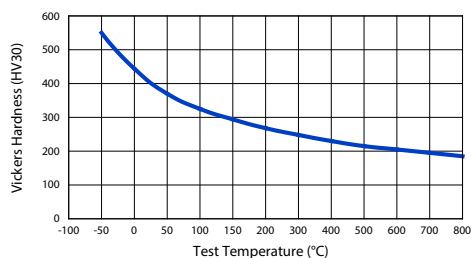
		Sheet-thicknesses	
		0,5 – 1,0 mm	> 1 – 5,0 mm
Hardness 293 K (20 °C)	HV 30	> 500	> 460
Tensile strength 293 K (20 °C) approx. 85% reduction	N/mm ²	> 1300	> 800
Modulus of elasticity 293 K (20 °C)	kN/mm ²		410
Modulus of rigidity 293 K (20 °C)	kN/mm ²		177

Physical Properties	Electrical conductivity 293 K (20 °C)	MS/m	18
	Electrical resistance 293 K (20 °C)	Ω.mm ² /m	0,055
	Specific heat	J / g.K	0,14
	Thermal conductivity 293 K (20 °C)	W/m.K	125
	Density	g/cm ³	19,3

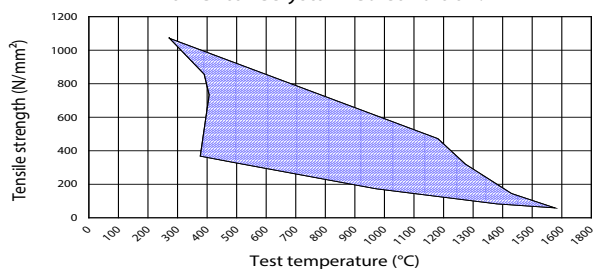
Available sizes	Sheets, wire, bars, machined parts
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Advice	Tensile strength properties depend on cross-section and design.
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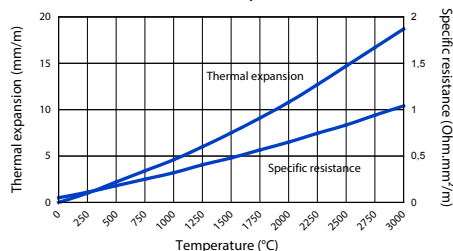
Vickers Hardness of 3 mm tungsten sheet versus temperature



Tensile strength of 1 mm tungsten sheet at higher temperature. The upper limit corresponds to stress relieved and the lower to recrystallized condition.



Thermal expansion and specific resistance versus temperature



Machining Instructions

In connection with machining preheating to about min. 200°C (473 K) is recommended, especially at thick-walled pieces. EDM-machining (wire cutting) is possible.

Drilling	Tungsten Carbide ISO K 05	HSS* 1.3202
Cutting speed m/min.	20 – 25	5 – 7
Lip angle	as with steel	as with steel
Machining	dry	dry

Turning	Tungsten Carbide ISO K 05
Cutting speed (m/min)	30 – 50
Rake angle	approx. 25°
Clearance angle	8 – 10°
Lip angle	90°
Machining	dry

Milling	Tungsten Carbide ISO K 10 or ISO K 05
Cutting speed (m/min)	20 – 25
Rake angle	10°
Clearance angle	8°
Lip angle	90°
Radius	3 mm
Feed	0,3 mm
Depth of cut	2 mm
Machining	dry

Grinding	Silicon Carbide wheels alt. diamond wheels
Hardness	H, J, K
Grain size	60 – 120
Structure	medium
Binder	ceramic
Cutting speed (m/sec)	30
Machining	intensive cooling

Wire-cut EDM and die sinking	Possible, electrodes and machining datas according to the machine producers experience.
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All statements as to the properties or utilization of the materials and products mentioned in this datasheet are only for description. Guarantees in respect of the existence of certain properties or utilization at the material mentioned are only valid if agreed upon in writing.

*(HSS) High Speed Steel