Tungsten
Technical Datasheet

DURO METALL
Ein Unternehmen der Wieland-Gruppe

Short Name		**Chemical**	W
Code	Tungsten	**Composition**	min. 99,95 %
Material-No.(alt)	-	(Reference values in %)	

Material-Properties	Tungsten is hard and brittle, his corrosion resistance to many acids is excellent, the machinability is difficult. High hardness under elevated temperatures, highest melting point of all metals, high effect against radiation.

Applications	• 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

Mechanical Properties (Reference values)			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) ca. 85 % reduction	N/mm²	>1300	> 800
	Modulus of elasticity 293 K (20 °C)	kN/mm²	410	
	Modulus of rigidity 293 K (20 °C)	kN/mm²	177	

Physical Properties	Electrical conductivity 293 K (20 °C)	MS/m	18
	Electrical resistance 293 K (20 °C)	$\frac{\Omega \cdot mm^2}{m}$	0,055
	Specific heat	$\frac{J}{g \cdot K}$	0,14
	Thermal conductivity 293 K (20 °C)	$\frac{W}{m \cdot K}$	125
	Density	$\frac{g}{cm^3}$	19,3

Available sizes	Sheets, wire, bars, machined parts
	Tensile strength properties depend on cross-section and design.

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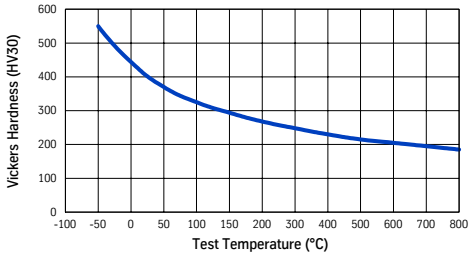
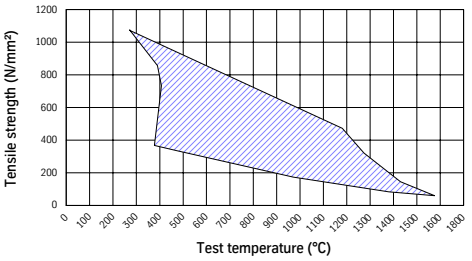
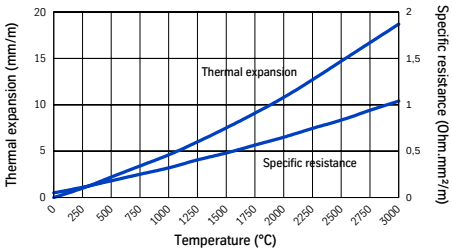
Vickers Hardness of 3 mm tungsten sheet versus temperature



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 473 K (200 °C) is recommended, especially at thick-walled pieces. EDM-machining (wire cutting) is possible.

Drilling	Tungsten Carbide ISO K 05	High speed Steel THYRAPID 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	c. 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

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