

# TZM

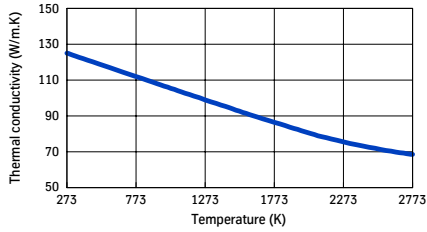
## Technical Datasheet

<b>Code</b>	TZM (Titanium-Zirkonium-Molybdenum)		<b>Chemical Composition</b>	Ti	Zr	C	Mo
<b>Material-No. (old)</b>	-		(Reference values in %)	0,5	0,08	0,03	balance
<b>Material-Properties</b>	High melting point, higher high-temperature strength in comparison with pure Molybdenum, low thermal extension, good thermal conductivity and chemical resistance.						
<b>Applications</b>	<ul style="list-style-type: none"> <li>• Trays in continuous heating furnaces</li> <li>• Sinter boats</li> <li>• Hot-runner tips in plastic injection nozzles</li> <li>• Vacuum furnace heating elements</li> </ul>						
<b>Mechanical Properties</b> (Reference values)	Hardness	HV		230 – 250			
	Tensile strength c. 85 % reduced	N/mm <sup>2</sup>		800 – 1.000			
	Yield strength	N/mm <sup>2</sup>		750 – 900			
	Elongation L = 5 D	%		6 – 10			
	Modulus of elasticity 293 K (20 °C)	kN/mm <sup>2</sup>		300			
<b>Physical Properties</b>	Electrical conductivity 293 K (20 °C)	MS/m		c. 15			
	Electrical resistance 293 K (20 °C)	$\frac{\Omega \cdot \text{mm}^2}{\text{m}}$		c. 0,06			
	Coefficient of electrical resistance	$\frac{1}{\text{K}}$		c. 0,0046			
	Coefficient of thermal expansion 273-573 K (0-300°C)	$\frac{1}{\text{K}}$		5,3 – 5,7 · 10 <sup>-6</sup>			
	Specific heat	$\frac{\text{W}}{\text{m} \cdot \text{K}}$		0,25			
	Thermal conductivity 293 K ( 20 °C)	$\frac{\text{J}}{\text{g} \cdot \text{K}}$		c. 130			
	Density	$\frac{\text{g}}{\text{cm}^3}$		10,2			
<b>Available sizes</b>	Wire, bars, sheets, machined parts against drawing						
	Tensile strength properties depend on cross-section and design.						

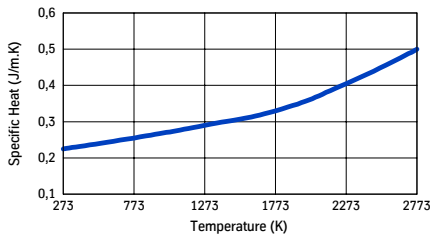
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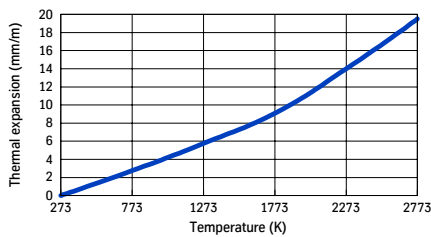
Thermal conductivity of TZM at various temperatures



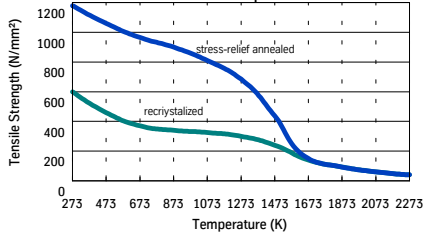
Specific heat of TZM at various temperatures



Thermal expansion of TZM at various temperatures



Tensile strength at 1 mm thickness TZM-sheets at various temperatures



### Machining Instructions (Reference values)

#### Turning

	Tungsten Carbide ISO K 05	HSS THYRAPID 3202
Cutting speed m/min.	70 – 120	30 – 40
Rake angle	c. 20°	c. 20°
Feed and depth of cut	-	-
Clearance angle	7 – 10°	7 – 10°

#### Milling

	Tungsten Carbide ISO K10 or ISO K05	HSS THYRAPID 3202
Cutting speed m/min.	80 – 120	20 – 25
Rake angle	10°	10°
Feed mm/min.	-	-

#### Drilling

	Tungsten Carbide ISO K10 or ISO K05	HSS THYRAPID 3202
Cutting speed m/min.	12	10 - 15

All statements as to the properties or utilization of the materials and products mentioned in this datasheet are only for the purpose of description. Guarantees in respect of the existence of certain properties or utilization at the material mentioned are only valid if agreed upon in writing.