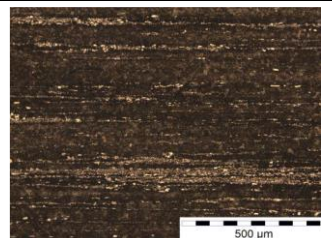
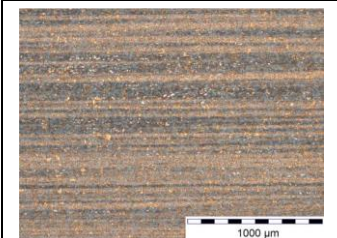
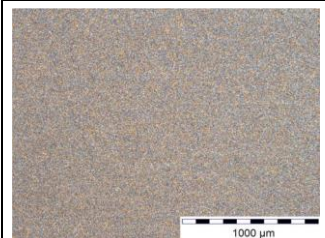


Technical data sheet		Grade	PT-SM4 powderTEC®	 PM-steel with choice					
		powderTEC® is a registered trademark of W. Oberste-Beulmann GmbH Co. KG							
Chemical composition (%)		Material properties							
Carbon content	1,40	PT-SM4 powderTEC® is a powder metallurgically produced, high V-alloyed high-performance high-speed steel with a very fine, uniform, segregation-free microstructure and carbide distribution. PT-SM4 powderTEC® guarantees very high wear resistance, cutting edge stability and compressive strength thanks to its balanced alloy layer. PT-SM4 powderTEC® can be nitrided very well and is also very suitable for PVD and CVD coating thanks to its homogeneous microstructure.							
Silicon	0,60								
manganese	0,30								
chromium	4,10								
Molybdenum	5,10								
Vanadium	4,00								
Tungsten	5,50								
Cobalt	-								
other	-								
Intended use		Manufacturing program							
• Punching, cutting, pressing and forming tools • Cold work applications • Tools for cold forming • Powder presses • Taps and twist drills • Broaching tools • Milling cutters • Special cutting tools		Delivery form	Dimension (mm)						
		Round	3 - 350 mm						
		Flat	5 x 50 to 205 x 505 mm						
		Square	10 - 300 mm						
		wire	on request						
		Sheet metal	on request						
		Round blanks	on request						
Material properties		Relative toughness (guide values)							
Melting	Powder metallurgy		HRC	0	2	4	6	8	10
Delivery condition	soft annealed	1.2379	60						
Hardness (HB)	approx. 250	1.3343	64						
Tensile strength (N/mm²)	-	PT-SM4	62						
Working hardness (HRC)	59 - 65	PT-SM4	65						
Microstructure	-								
Degree of purity (DIN 50602)	K1 max. 15								
Physical properties		Relative wear resistance (standard values)							
Specific weight (g/cm³)	8,00		HRC	0	2	4	6	8	10
	20°C 260°C 400°C 540°C	1.2379	60						
Modulus of elasticity E (GPa)	214	1.3343	64						
Thermal conductivity (W / m * K)	19	PT-SM4	62						
Coefficient of thermal expansion over a temperature range from 20 - ... °C (mm / mm °C)	11,5 12,1	PT-SM4	65						
Comparison of the microstructure properties									
Carbide distribution (v = 100:1)					Segregations (v = 50:1)				
Conventional		OB powderTEC®			Conventional		OB powderTEC®		
									



Heat treatment

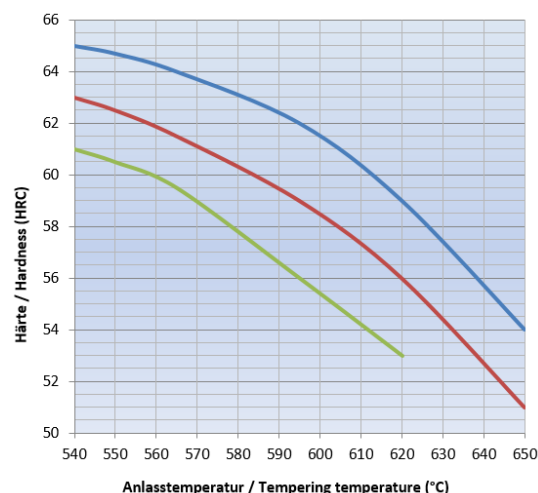
Soft annealing

Heating	uniformly to 850 - 900 °C
Holding time	2 h
Cooling down	Oven
Cooling rate	approx. 15 °C / h to below 540 °C
Final cooling	still air

Low stress annealing

Heating	to 600 - 700 °C
Cooling down	After complete heating through Oven - to approx. 500 °C
Final cooling	still air

Tempering diagram



Hardening

Preheating stage 1	450 - 500 °C
Preheating stage 2	850 - 900 °C
Preheating stage 3 **)	1050 - 1080 °C

**) depending on the tool geometry and the hardening temperature (> 1150 °C)

Hardening temperature	1080 - 1200 °C
1090 °C	maximum toughness
1200 °C	maximum wear resistance
1150 °C	best combination of toughness and wear resistance

1170 - 1200 °C Recommendation for cutting tools

The holding times must be adjusted accordingly for large or very thin-walled tool cross-sections. The normal guidelines for high-speed steel can be used.

Hardness (+/- 1 HRC)

Tempering temperature	1080 °C	1120 °C	1180 °C
540 °C	61	63	65
560 °C	59	61	64
595 °C	56	59	62
620 °C	53	56	59

Hardening temperature

Service hardness (depending on the heat treatment parameters)

For cold work applications, tempering should always be carried out at 560 °C, regardless of the austenitizing temperature used.

Cooling

Cooling medium	Air, hot bath (at 540 °C), interrupted Oil quenching
Cooling vacuum	min. 5 bar overpressure
Cooling salt bath / oil	Achieving maximum hardness
Final cooling	still air - < 40 °C
Recommendation	Best toughness properties through Hot bath cooling (approx. 550 °C)

Heat treatment instructions

1st preheating stage	450 - 500 °C
2nd preheating stage	850 - 900 °C
3rd preheating stage **)	1050 - 1080 °C
Hardening	see table
Tempering	560 °C - 3 x 2 hours each
Service hardness	59 - 64 HRC
Remark	**) at hardening temperature > 1150 °C

Tempering

Time	Slow heating to tempering temperature immediately after hardening.
Tempering temperature	560 °C
Dwell time in the oven	1 hour / 20 mm workpiece thickness, min. 2 h
Tempering cycles	min. 3 cycles.
	Tools must cool down to room temperature between tempering cycles.

Surface treatment

Surface coating using the CVD or PVD process is possible. The use of all common nitriding processes is also possible at any time.

Note: The information contained in this data sheet is for descriptive purposes only; any liability is excluded.

May
2025