

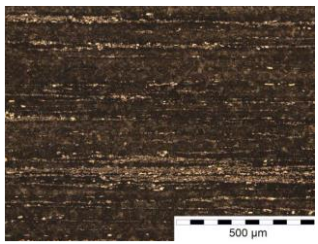
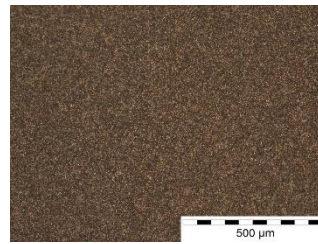
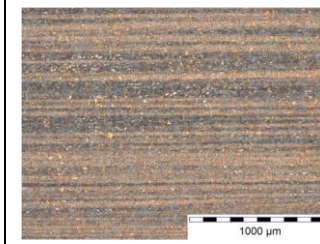
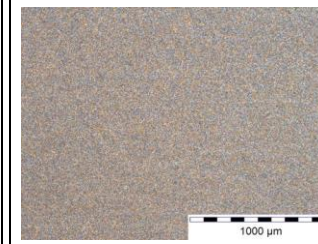


Technical data sheet	Grade	PT-S23 powderTEC®	
powderTEC® is a registered trademark of W. Oberste-Beulmann GmbH Co. KG			

Chemical composition (%)	Material properties		
Carbon	1,30	PT-S23 powderTEC® is a powder metallurgically produced high-performance high-speed steel with a very fine, uniform, and segregation-free microstructure and carbide distribution.	
Silicon	0,60		
Manganese	0,30	PT-S23 powderTEC® offers good wear resistance and toughness, along with excellent dimensional stability.	
Chromium	4,10		
Molybdenum	5,00		
Vanadium	3,10		
Tungsten	6,30		
Cobalt	-		
Other	-		

Intended use	Manufacturing program
- High-performance cutting tools Applications include not only steel but also titanium and nickel-based alloys - Punching, cutting and forming tools - Machining tools such as highly stressed hobbing cutters, broaching tools, shaping cutters, cutting punches, dies, etc.	Delivery form Dimension (mm)
	Round 3 – 350 mm
	Flat 5 x 50 bis 205 x 505 mm
	Square 10 – 300 mm
	Wire on request
	Sheet metal on request
	Round blanks on request

Material properties	Physical properties
Melting Powder metallurgy	20°C 400°C 600°C
Delivery condition soft annealed	Specific weight (g/cm³) 8,00 7,9 7,9
Hardness (HB) max. 250	Modulus of elasticity E (GPa) 230 205 184
Tensile strength (N/mm²) -	Thermal conductivity (W / m * K) 24 28 27
Working hardness (HRC) 58 – 64	Coefficient of thermal expansion (10⁻⁶/m.K) 12,1 12,7
Microstructure -	
Degree of purity (DIN 50602) K1 max. 15	

Comparison of microstructure properties			
Carbide distribution (V = 100:1)		Segregations (V = 50:1)	
Conventional	OB powderTEC®	Conventional	OB powderTEC®
			

Comparison of properties						
Werkstoff Grade	Bearbeitbarkeit Machinability	Verschleißwiderstand Wear resistance	Zähigkeit und Duktilität Toughness and Ductility	Warmhärte Red Hardness	Schleißbarkeit Grindability	Druckbelastbarkeit Compressive Strength
1.3243	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
1.3343	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
PT-SM4	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
PT-S23	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
PT-S30	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
PT-S52	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
PT-S53	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10
PT-S60	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10	0 2 4 6 8	0 2 4 6 8 10



Heat treatment

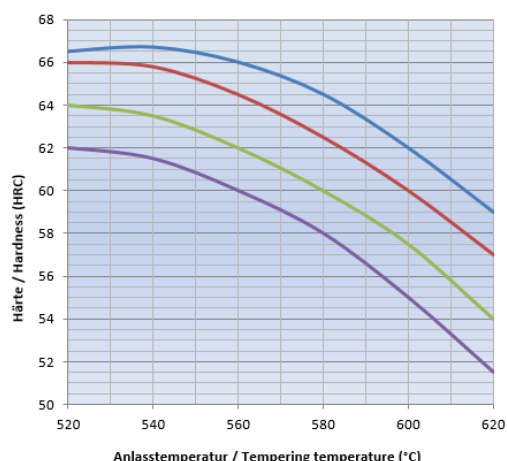
Soft annealing

Heating	uniformly to 850 - 900 °C
Holding time	3 h
Cooling down	Oven
Cooling rate	approx. 10 °C / h to 700 °C
Final cooling	still air

Low stress annealing

Heating	to 600 – 700 °C
Cooling down	After complete heating through Furnace - 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	1050 – 1180 °C

The holding times must be adjusted accordingly for large or very thin-walled tool cross-sections

Hardness (+/- 1 HRC)

Hardening temperature

Tempering temperature	1050 °C	1100 °C	1150 °C	1180 °C
520 °C	62	64	66	67
540 °C	61	63	65	66
560 °C	60	62	64	66
580 °C	58	60	63	65
600 °C	55	57	60	62
620 °C	52	54	57	59

Service hardness (depending on the heat treatment parameters)

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 - < 50 °C
Recommendation	Best toughness properties through hot bath cooling

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	60 – 66 HRC
Remark	**) at hardening temperature > 1150 °C

Tempering

Time	Slow heating to tempering temperature immediately after hardening.
Tempering temperature	520 – 620 °C
Dwell time in the oven	1 hour / 20 mm workpiece thickness, min. 2 h
Tempering cycles	at least 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.