

Technical data sheet	Grade	PT-K03 powderTEC®	 PM-steel with choice
powderTEC® is a registered trademark of W. Oberste-Beulmann GmbH Co. KG			

Chemical composition (%)	Material properties
Carbon content	0,80
Silicon	1,00
manganese	0,50
chromium	7,60
Molybdenum	1,30
Vanadium	2,80
Tungsten	-
cobalt	-
other	-

PT-K03 powderTEC® is a powder metallurgically produced high-performance steel for cold work with a very fine, uniform, segregation-free microstructure and carbide distribution.

PT-K03 powderTEC® offers significantly better fracture toughness compared to conventional tool steels such as 1.2363 and 1.2379.

PT-K03 powderTEC® is the problem solver when it comes to high process reliability for fracture-prone tools. With service hardnesses of approx. 58 - 60 HRC, it offers high fracture resistance combined with good wear resistance.

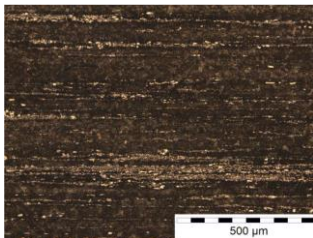
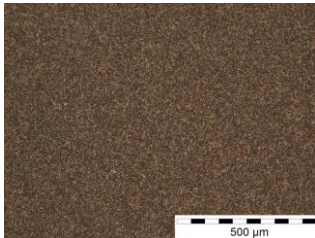
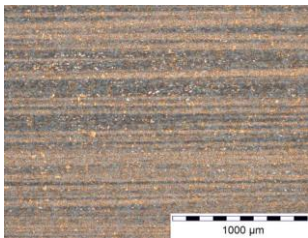
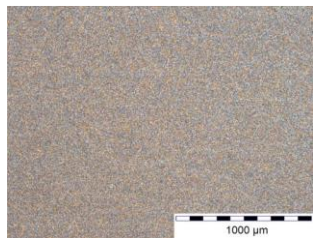
Intended use	Manufacturing program														
- Cutting and punching tools especially for thicker sheets - Fine blanking tools - Pressing and forming tools - Thread rolling and rolling tools - Hole punches, shearing and industrial knives - Sintering presses - Tools / tool inserts in plastics processing, extruder and trimming tools	<table> <tr> <th>Delivery form</th><th>Dimension (mm)</th></tr> <tr> <td>Round</td><td>3 - 350 mm</td></tr> <tr> <td>Flat</td><td>5 x 50 to 205 x 505 mm</td></tr> <tr> <td>Square</td><td>10 - 300 mm</td></tr> <tr> <td>wire</td><td>on request</td></tr> <tr> <td>Sheet metal</td><td>on request</td></tr> <tr> <td>Round blanks</td><td>on request</td></tr> </table>	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
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Material properties	Relative toughness (guide values)
Melting	Powder metallurgy
Delivery condition	soft annealed
Hardness (HB)	approx. 240
Tensile strength (N/mm²)	-
Working hardness (HRC)	54 - 63
Microstructure	-
Degree of purity (DIN 50602)	K1 max. 15

HRC	0	2	4	6	8	10
1.2379	60					
PT-K03	58					
PT-K03	60					
PT-K03	62					
1.3343	64					
PT-SM4	62					

Physical properties	Relative wear resistance (guide values)
Modulus of elasticity E (GPa)	215
Specific weight (g/cm³)	7,70
Thermal conductivity (W / m * K)	100 C°
	24,2
Coefficient of thermal expansion over a temperature range of 20 - ... °C (mm / mm °C)	200°C
	10,6

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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 900 °C
Holding time	2 h
Cooling down	oven
Cooling rate	approx. 15 °C / h to 590 °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

Hardening

Preheating stage 1	450 - 500 °C
Preheating stage 2	850 - 900 °C
Austenitizing temperature	1030 - 1120 °C
1030 °C - approx. 40 min	Maximum toughness
1120 °C - approx. 30 min	highest wear resistance
Max. Austenitizing temperature	1120 °C

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

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
Recommendation	Best toughness properties due to Hot bath cooling

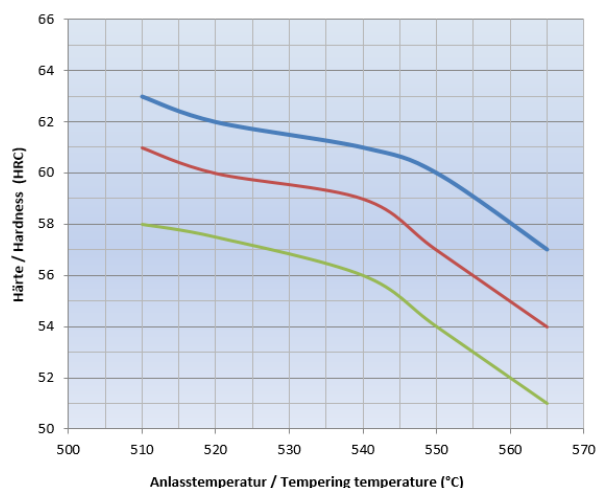
Tempering

Time	Slow heating to tempering temperature immediately after hardening. Temper immediately after the tool has cooled to below 40 °C
Tempering temperature	520 - 565 °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.

Tempering diagram



Hardness (+/- 1 HRc)

Austenitizing temperature

Tempering temperature	1030 °C	1070 °C	1120 °C
Initial hardness	58 HRc	62 HRc	63 HRc
520 °C	57 HRc	60 HRc	62 HRc
540 °C	56 HRc	59 HRc	61 HRc
550 °C	54 HRc	57 HRc	60 HRc
565 °C	51 HRc	54 HRc	57 HRc

Service hardness (depending on the heat treatment parameters)

Recommended heat treatment

Austenitizing temperature	1070 °C
Holding time	30 - 40 minutes
Cooling down	Warm bath
Tempering	525 - 540 °C 3 x 2 hours each
Service hardness	58 - 60 HRc