DIE *WELT* DES EDELSTAHLS
THE *WORLD* OF SPECIAL STEEL

Oberste-Beulmann
Edelstähle-Special Steels

Technical data sheet	Grade	PT-K39 powderTEC®

powderTEC® is a registered trademark of W. Oberste-Beulmann GmbH Co. KG

powderTEC® PM-steel with choice

Chemical composition (%)

Carbon	2,48
Silicon	0,50
Manganese	0,30
Chromium	4,30
Molybdenum	4,00
Vanadium	8,90
Tungsten	1,00
Cobalt	2,00
Other	-

Material properties

PT-K39 powderTEC® is a powder metallurgically produced cold working with a very fine, uniform, segregation-free microstructure and carbide distribution. Through an increased vanadium content and the resulting enrichment of the microstructure with hard carbides, the abrasive wear resistance has been improved.

PT-K39 powderTEC®, compared to PT-S52 powderTEC®, is characterized by improved wear resistance while maintaining its excellent toughness properties.

PT-K39 powderTEC® can withstand the highest of pressure loads.

Intended use

- Tools for cold and semi-hot working applications such as extrusion tools, drawing dies, coining tools, powder compacting tools, cold rolling tools and pilger mandrels
- Cutting and punching tools, fine blanking tools
- Cold-heading punches, piercing punches
- Knives for cutting, shearing, deburring, foil cutting knives, knives for the recycling, paper and packaging industries
- Wear parts in plastics processing such as injection molding tools, cylinders and feed screws, inserts, and injection nozzles

Manufacturing program

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

Melting	Powder metallurgy
Delivery condition	soft annealed
Hardness (HB)	max. 250
Tensile strength (N/mm²)	-
Working hardness (HRc)	58 - 64
Microstructure	-
Degree of purity (DIN 50602)	K1 max. 15

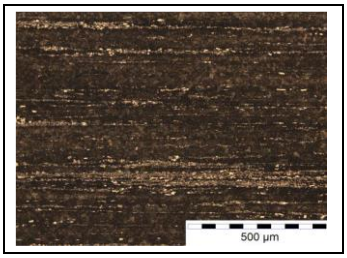
Physical properties

	20°C	100°C	300°C	500°C
Specific weight (g/cm³)	7,50		7,40	7,35
Modulus of elasticity E (GPa)	221	216	204	188
Thermal conductivity (W / m * K)	20,1	21,6	24,2	25,9
Coefficient of thermal expansion (10^{-6}m/m.K)		12,20	13,00	13,70

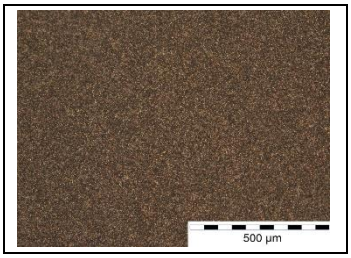
Comparison of microstructure properties

Carbide distribution (V = 100:1)

Conventional

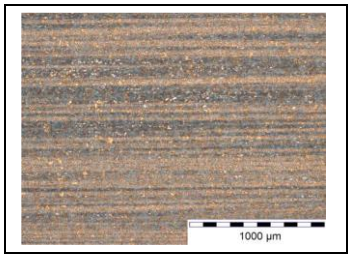


OB powderTEC®

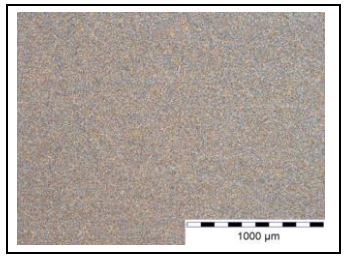


Segregations (V = 50:1)

Conventional



OB powderTEC®



Heat treatment

Soft annealing

Heating	uniformly to 870 - 900 °C
Holding time	2 h
Cooling down	oven
Cooling rate	approx. 10 °C / h to 540 °C
Final cooling	calm air

Low-voltage annealing

Heating	650 – 700 °C
Holding time	At least 4 hours after complete heat penetration.
Cooling down	Oven – at approx. 500 °C
Final cooling	Calm air

Wilhelm Oberste-Beulmann GmbH & Co. KG
An der Hasenjagd 2, D-42897 Remscheid | Tel.: +49 (0) 2191 93 60-0, Fax: +49 (0) 2191 34 99 80 | info@oberste-beulmann.de | www.oberste-beulmann.de

Hardening

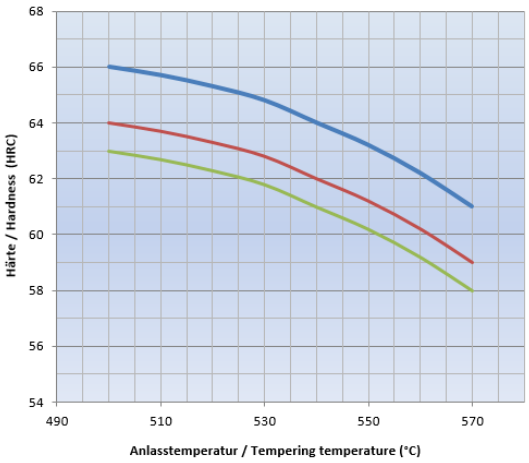
Preheating stage 1	450 - 500 °C
Preheating stage 2	850 - 900 °C
Preheating stage 3 **)	1050 – 1080 °C

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

Austenitizing temperature	1030 – 1180 °C
1070 °C	High toughness
1180 °C	Highest wear resistance

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

Tempering diagram



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 through hot bath cooling

Hardness (+/- 1 HRc)	Hardening temperature		
Tempering temperature	1070 °C	1110 °C	1180 °C
540 °C	61,0	62,0	64,0
550 °C	60,0	61,0	62,0
560 °C	59,0	60,0	61,0

Service hardness (depending on the heat treatment parameters)

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

Tempering

Time	Slow heating to tempering temperature immediately after hardening.
	Temper immediately after the tool has cooled to below 50 °C
Tempering temperature	540 - 560 °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.

Heat treatment instructions

1st preheating stage	450 - 500 °C
2nd preheating stage	870 - 900 °C
3rd preheating stage	1050 - 1080 °C
Hardening	see table
Tempering	550 °C - 3 x 2 hours each
Service hardness	60 - 62 HRc

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.

May 2025

Wilhelm Oberste-Beulmann GmbH & Co. KG

An der Hasenjagd 2, D-42897 Remscheid | Tel.: +49 (0) 2191 93 60-0, Fax: +49 (0) 2191 34 99 80 | info@oberste-beulmann.de | www.oberste-beulmann.de