VACO 180T^{cold}, Special Tool Steel
Data Sheet – Tooling Alloys

Zapp is certified to ISO 9001

Key features of Zapp's high-strength precipitation-hardening tool steel VACO 180T^{cold}

- The nearly carbon-free base matrix consists of iron, nickel, cobalt, molybdenum, and titanium.
- Strength as supplied ~ 1,000 MPa / ~ 30 HRC.
- Excellent toughness and resistance to crack propagation.
- High-gloss polishable.
- Good machinability and weldability.
- Simple heat treatment at low temperatures, with low warpage and minimal dimensional change.
- Case hardness up to 55 HRC possible.
- Tensile strength up to 2,100 MPa possible.

Typical areas of application

- Mechanical and plant engineering
- Aerospace
- Automotive engineering, chassis parts
- Plastic injection molds
- Cold-forming tools

Physical properties (at 20°C unless otherwise stated)

Modulus of elasticity E [GPa]	200
Shear modulus G [GPa]	73
Density [kg/dm^3]	8.1
Spec. electr. resistance [Ohm*mm2/m]	0.42
Specific heat [kJ/(kg*K)]	420
Dimensional change during hardening (in longitudinal direction)	approx. -0.08%
Thermal expansion coefficient [mm/mm/K] in a temperature range of	
20 – 100 °C	10.3 x 10^{-6}
20 – 200 °C	10.7 x 10^{-6}
20 – 300 °C	11.0 x 10^{-6}
20 – 400 °C	11.3 x 10^{-6}
20 – 500 °C	11.6 x 10^{-6}
Thermal conductivity [W/(m*K)]	21.0

Delivery condition

As-delivered condition	Solution-annealed, approx. 340 HB
Product form	Round bars, flat bars
Surface finish	Machined or black

Mechanical properties
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	Tensile strength, MPa	Yield strength, MPa	A5, min, %	Necking, min, %	Notched impact strength at room temperature (DIN EN ISO 148 – 1), J	Fatigue strength, MPa	Thermal yield limit, min	K_{IC} (fracture Toughness) MPa	Transverse contraction coefficient	Notch strength ratio
Hardened	1900 – 2100	1800	9	40	25	>730	1830 (100 °C) 1720 (200 °C) 1620 (300 °C) 1490 (400 °C) 1130 (500 °C)	-	-	-
Solution annealed	980 – 1100	900	10	60	50	-	-	80	0.30	1.30

Heat treatment

Solution annealing

- In neutral atmosphere at ~ 820 °C and ~ 1 h exposure time (after through-heating)
- Followed by furnace cooling
- Solution annealing hardness ~ 340 HB

Ageing

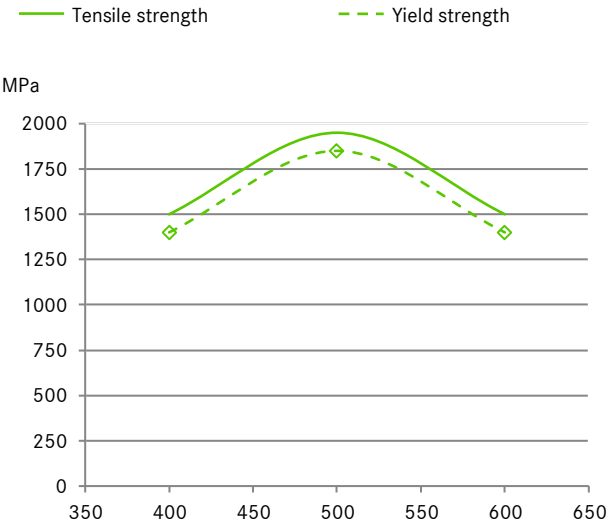
- ~ 500 °C/ ~ 4 h exposure time (after through-heating)
- Slow furnace cooling necessary afterwards!
- Hardness/strength see table

Surface treatments

Nitriding is possible

Ageing Diagram

Diagram shows values along the rolling direction, solution annealed 820 °C/1 h/air, age hardening time 4 h.



You can find more materials at:
www.zapp.com/werkstoffe/pm-stahl-werkzeugstahl

Zapp Precision Metals GmbH ensures professional execution of all heat treatment steps as well as their preparation and post-processing (e.g., charging, hardness testing, straightening processes, etc.)—always with the aim of obtaining the optimum component properties!
We are happy to assist you with constructive advice!

TOOLING ALLOYS

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