

TOOLING ALLOYS

DATA SHEET ZAPP VACO 180T

ZAPP

ZAPP IS CERTIFIED TO ISO 9001



ZAPP VACO 180T – SPECIAL MATERIAL

is a high Ni – Co – Mo – Ti alloyed maraging steel for highest requirements in toughness and fatigue strength. In comparison to the quenched and tempered steel grades, the material achieves its hardness due to precipitation of intermetallic phases in a tough matrix which is poor of carbon.

PROPERTIES

- _ High toughness and compressive strength
- _ High yield- and ultimate tensile strength
- _ High fatigue strength
- _ Easy heat treatment
- _ Good dimension stability
- _ No risk of decarburization
- _ Through hardening also for bigger dimensions
- _ Good weldability

DELIVERY CONDITION

Solution annealed maximum 230 HB

TYPICAL APPLICATIONS

- _ High performance shafting
- _ Gear components
- _ Fasteners
- _ Plastic industry
- _ Food industry
- _ Wear parts
- _ Pressing tools

Zapp VACO180T can be nitrided (gas nitriding at 500°C/45h) in order to increase tool life in warm applications.

HEAT TREATMENT

HOT WORKING TEMPERATURE

1100 °C – 900 °C

SOLUTION ANNEALING

820 °C/ air/ gas
max. 320 HB

PRECIPITATION ANNEALING

500 °C/ 4 h/ air

Quenching and fast cooling is not allowed.

PHYSICAL PROPERTIES (AT 20°C)

Density	8.10kg/dm ³
Specific heat	420 J/(kg*K)
Thermal conductivity	21.0 W/(m*K)
Spec. electr. resistance	0.42 Ohm*mm ² /m
Modulus of elasticity	200*10 ³ MPa
Shear modulus	73*10 ³ MPa
Dimension changes during precipitation hardening (in longitudinal direction)	app. -0.08%
Thermal expansion coefficient [10 ⁻⁶ /(m*K)]	
20 – 100 °C	10.3
20 – 200 °C	10.7
20 – 300 °C	11.0
20 – 400 °C	11.3
20 – 500 °C	11.6

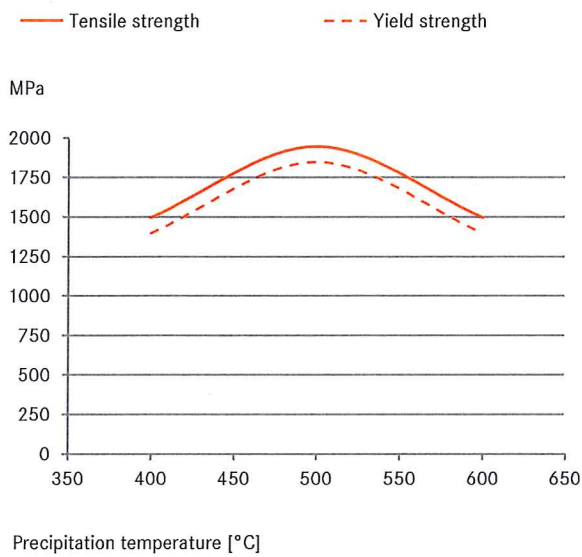
MECHANICAL PROPERTIES

	Tensile strength, MPa	Yield strength, MPa	A5, min, %	Necking min, %	Notch impact energy at room temperature, J	Fracture toughness, MPa	Yield point at elevated temperatures, min	K _{IC} Fracture toughness MPa	Poisson's ratio	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

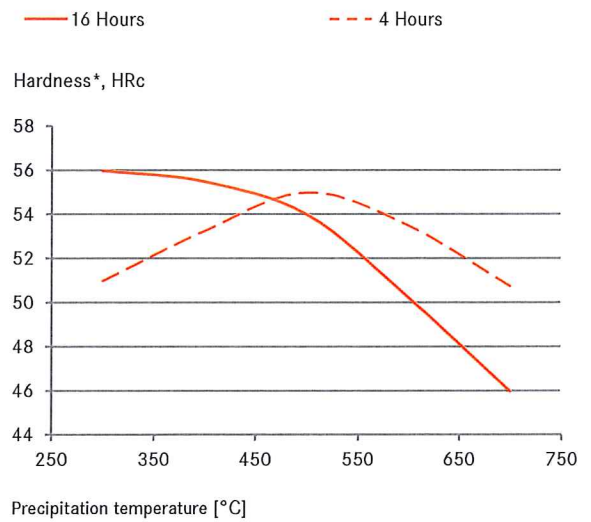
* DIN EN ISO 148-1

PRECIPITATION HARDENING DIAGRAM

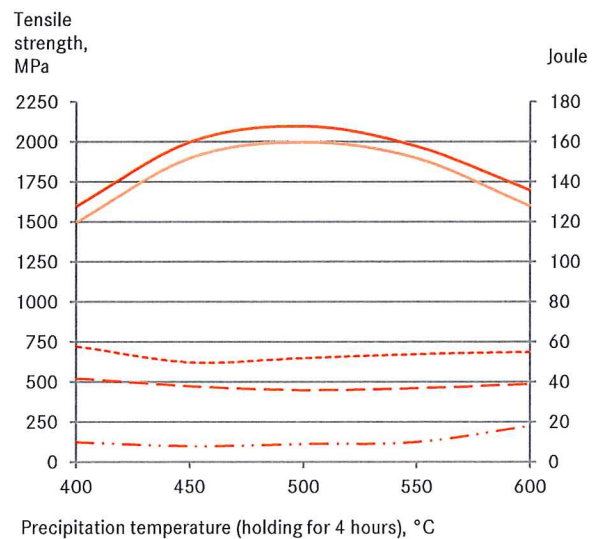
Diagram shows values longitudinal to the rolling direction, solution annealed at 820°C/1h/air, Precipitation annealing for 3h.



HARDENING DIAGRAM



* Hardness values are reference values which can vary in the range of +/- 1 HRc



- Tensile strength in MPa
- - - Yield strength in MPa
- ... Necking in %
- · - Notch impact energy in J
- ... Elongation in %

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