Z-420 PM^{resist}, PM Stainless Tool Steel

Data Sheet - Tooling Alloys

Zapp is certified to ISO 9001

Key Features of Zapp's Powder Metallurgical High Speed Steel Z-420 PM^{resist}

- Produced using powder metallurgical processes
- High corrosion resistance
- Superior wear resistance to comparable brands
- Case hardness up to 61 HRC possible
- Food safety

Typical Areas of Application

- Mechanical engineering
- Food industry
- Plastics industry
- Extrusion tools

Typical chemical composition (weight %)

C	Cr	Mo	V
2.3	14.0	1.0	9.0

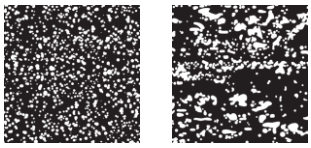
Physical properties

Modulus of elasticity E [GPa]	215
Density [kg/dm³]	7.4
Thermal expansion coefficient [mm/mm/K]	
in a temperature range of	11.0 x 10^{-6}
20 – 200 °C	11.5 x 10^{-6}
20 – 300 °C	12.2 x 10^{-6}
20 – 600 °C	
Thermal conductivity [W/(m*K)]	17.3

Delivery condition

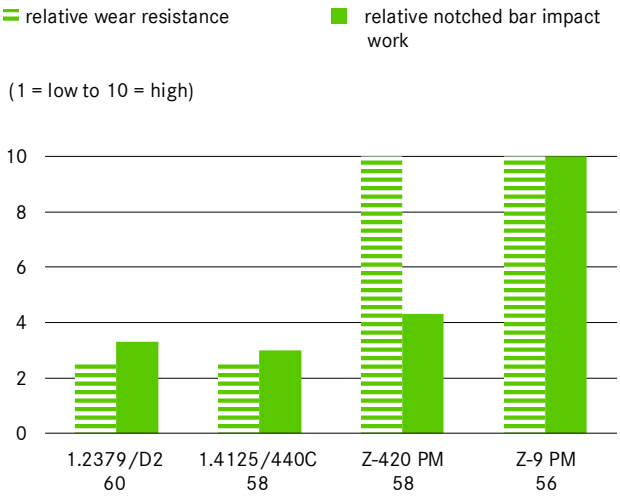
As-delivered condition	Soft-annealed, approx. 300 HB
Product forms	Round bars, flat bars, sheets
Surface finish	Mechanically machined

Powder metallurgical vs. conventional microstructure

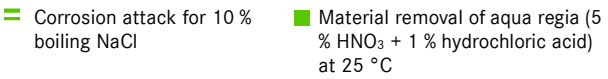


The homogeneous microstructure which is obtained by using powder metallurgical processes vs. the coarse carbide structure of conventionally produced steel

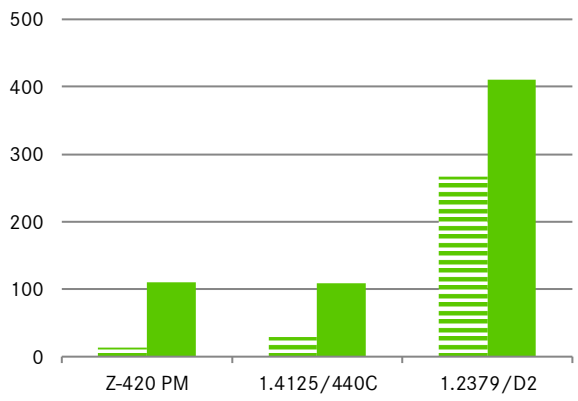
Qualitative comparison of the most important properties



Corrosion resistance



Qualitative comparison



Heat Treatment

Soft Annealing

- In neutral atmosphere at ~ 870 °C and ~ 4 h exposure time (after through-heating)
- Followed by furnace cooling (optimum cooling rate max. 15 °C/h up to 540 °C)
- Soft annealing hardness ~ 300 HB

Stress-relief annealing

~ 650 °C/ ~ 2 h exposure time (after through-heating) followed by furnace cooling

Additional information on hardening and tempering

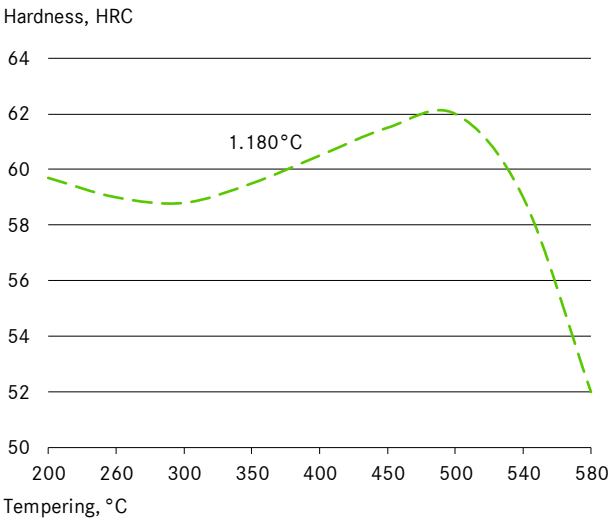
Highest corrosion resistance is achieved with low tempering temperatures (200 to 320 °C).

If maximum wear resistance is required, the tempering temperature is 540 °C and higher.

You can find more materials at:
www.zapp.com/en-uk/materials/powder-metallurgical-tool-steel

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!

Tempering diagram



Vacuum heat treatment instructions

Pre-heating	professional heating, 3 pre-heating stages recommended
Vacuum heating	1,150 °C to 1,180 °C, see table
Exposure time	20 min. after through-heating
Cooling	In vacuum, a quenching pressure of at least 6 bar is required
Tempering	at least 3 times for 2 hours each according to table, allow to equilibrate to room temperature in between

Desired hardness HRc ± 1	Hardening temperature °C	Exposure time at hardening temperature minutes	Tempering °C
56	1,150	20	320
57	1,150	20	260
58	1,150	20	200
58	1,180	20	260
59	1,180	20	200
59	1,180	20	540

The maximum permissible hardening temperature of 1,180 °C should not be exceeded! **See additional information on hardening and tempering.**
Hardening or annealing with further heat treatment processes is possible, but should be discussed in advance!

TOOLING ALLOYS

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