

# Z-420 PM<sup>resist</sup>, 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<sup>resist</sup>

- 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

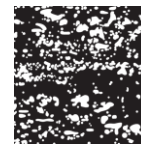
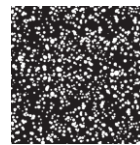
### Physical properties

Modulus of elasticity E [GPa]	215
Density [kg/dm <sup>3</sup> ]	7.4
Thermal expansion coefficient [mm/mm/K]	
in a temperature range of	
20 - 200 °C	$11.0 \times 10^{-6}$
20 - 300 °C	$11.5 \times 10^{-6}$
20 - 600 °C	$12.2 \times 10^{-6}$
Thermal conductivity [W/(m*K)]	17.3

### Delivery condition

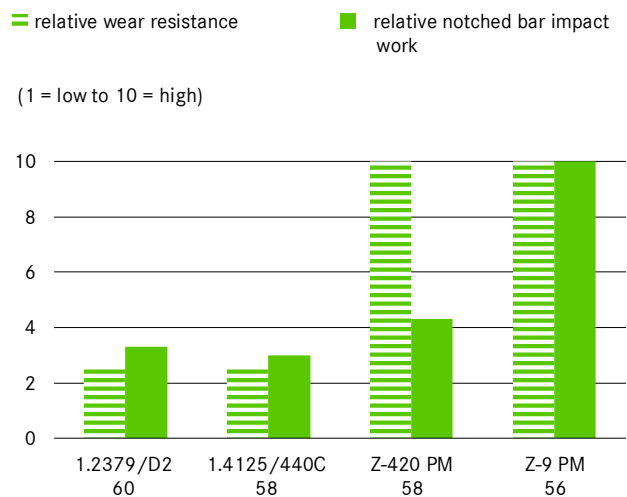
As-delivered condition	Soft-annealed, approx. 300 HB
Product forms	Round bars, flat bars, sheets
Surface finish	Mechanically machined

### 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

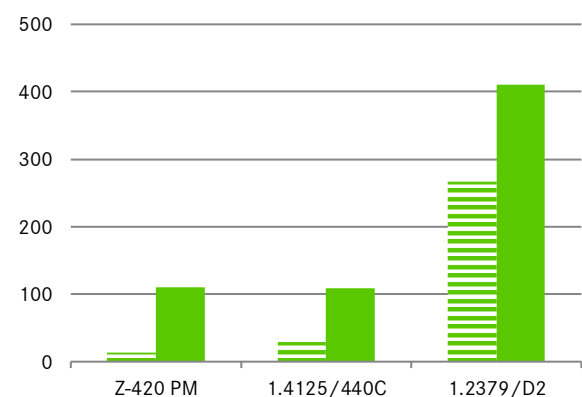
### Qualitative comparison of the most important properties



### Corrosion resistance

- Corrosion attack for 10 % boiling NaCl
- Material removal of aqua regia (5 % HNO<sub>3</sub> + 1 % hydrochloric acid) at 25 °C

### 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:

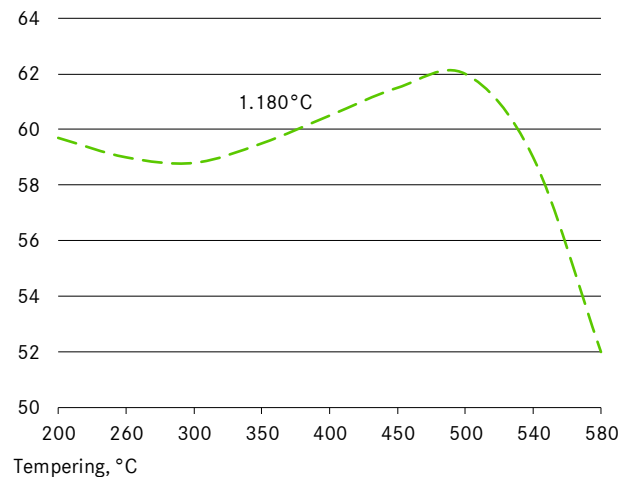
[www.zapp.com/en-uk/materials/powder-metallurgical-tool-steel](http://www.zapp.com/en-uk/materials/powder-metallurgical-tool-steel)

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

Hardness, HRC



### 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

### Zapp Precision Metals GmbH

Balcke-Dürr-Allee 1  
40882 Ratingen  
Phone +49 2304 79-566  
[Sales.TA@zapp.com](mailto:Sales.TA@zapp.com)  
[www.zapp.com](http://www.zapp.com)

Further information regarding our products and locations are available in our image brochure and on our homepage at [www.zapp.com](http://www.zapp.com).

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