Z-M62 PM^{speed}, PM High-Speed Steel

Data Sheet – Tooling Alloys

Zapp is certified to ISO 9001

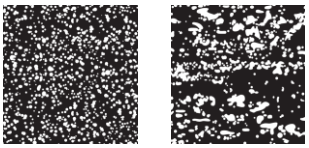
Key features of Zapp's powder metallurgical high-speed steel Z-M62 PM^{speed}

- PM 6-10-2
- Produced using powder metallurgical processes
- Cobalt-free high-speed steel
- High red hardness
- Case hardness up to 67 HRC possible

Typical areas of application

- Bearing steel
- Machining tools

Powder metallurgical and conventional microstructure



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

Physical properties

Modulus of elasticity E [GPa]	235
Density [kg/dm³]	8.17
Thermal expansion coefficient [mm/(mm/K)] in a temperature range up to	
20 °C – 100 °C	10.7 x 10^{-6}
20 °C – 200 °C	11.2 x 10^{-6}
20 °C – 300 °C	11.7 x 10^{-6}
20 °C – 425 °C	11.9 x 10^{-6}
20 °C – 540 °C	12.2 x 10^{-6}
20 °C – 600 °C	12.6 x 10^{-6}

Delivery condition

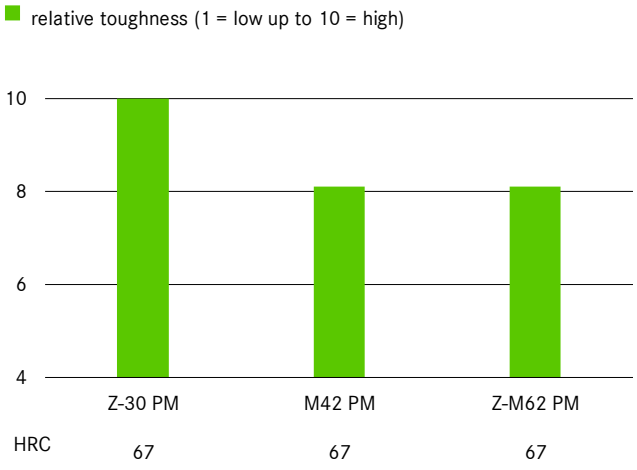
As-delivered condition	Soft-annealed, approx. 300 HB
Product form	Round bars, flat bars
Surface finish	Mechanically machined

Typical chemical composition (weight %)

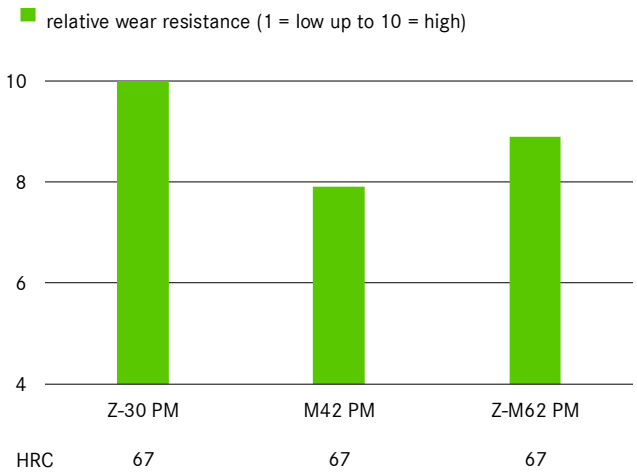
C	Cr	Mo	W	V	Co
1.3	3.8	10.5	6.3	2.0	free

Qualitative comparison of the most important properties

Toughness



Wear resistance



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. 10 °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

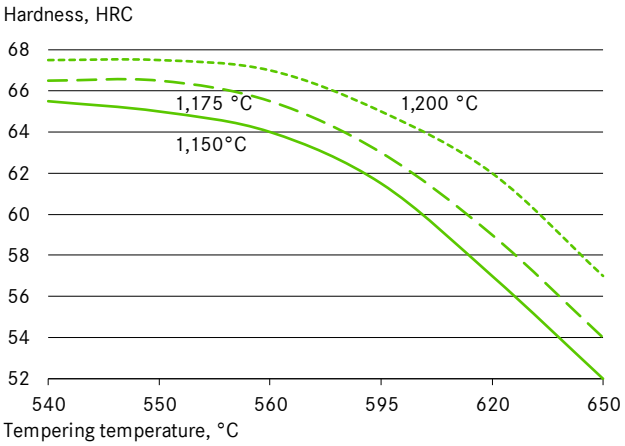
Surface treatments

Tempering temperatures of ≥ 560 °C provide the prerequisite for subsequent nitriding or PVD coating.

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	from 1,150 to 1,200 °C, see table
Exposure time	from 3 to 10 minutes after through-heating, see table
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, fourth tempering recommended, allow to equilibrate to room temperature in between

Desired hardness HRC ± 1	Hardness temperature °C	Exposure time at hardness temperature minutes	Tempering °C
64	1,150	10	560
66	1,175	5	550
67	1,200	3	550

The maximum specified hardening temperature of 1,200 °C should not be exceeded.
Hardening with further heat treatment processes is possible, but should be discussed in advance!

TOOLING ALLOYS

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