RSALLOYS
HOLDING GROUP

AZIENDA CERTIFICATA
ISO 9001

ACCIAI PM

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Z-23 PM speed

DATA SHEET

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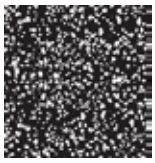
Key Features of Zapp's Powder Metallurgical High Speed Steel Z-23 PM^{speed}

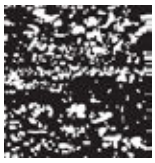
- PM 6-5-3
- Produced using powder metallurgical processes
- Standard powder high-speed steel
- Case hardness up to 66 HRC possible

Typical Areas of Application

- Cutting, punching, and fine blanking tools
- Pressing and forming tools
- Machining tools

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

PHYSICAL PROPERTIES

Modulus of elasticity E [GPa]	230
Density [kg/dm^3]	7.97
Thermal expansion coefficient [mm/(mm/K)] in a temperature range up to 400 °C 600 °C	11.5 x 10^{-6} 12.4 x 10^{-6} 13.0 x 10^{-6}
Thermal conductivity [W/(m*K)]	24.0

DELIVERY CONDITION

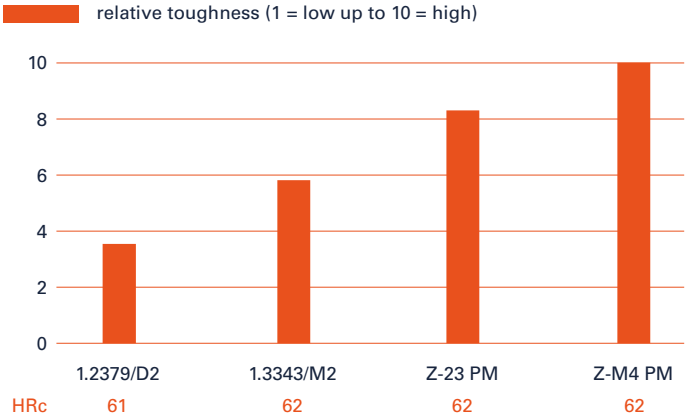
As-delivered condition	Soft-annealed, approx. 300 HB
Product form	Round bars, flat bars, sheets
Surface finish	Mechanically machined

Typical chemical composition (weight %)

C	Cr	Mo	W	V
1.3	4.2	5.0	6.4	3.0

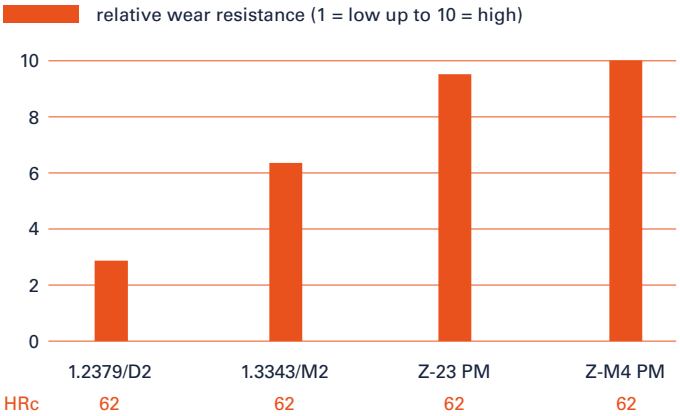
Qualitative comparison of the most important properties

TOUGHNESS



Standard size of the Charpy-test-piece with a 12.7 mm notch radius.

WEAR RESISTANCE



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HEAT TREATMENT DATA

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

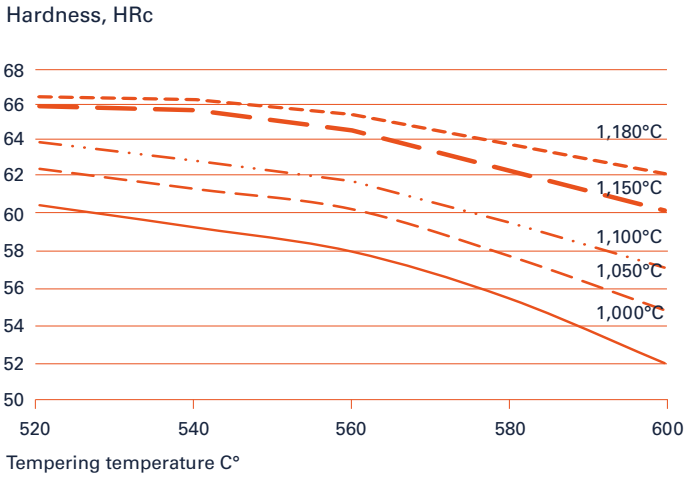
STRESS RELIEF ANNEALING

~ 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.

TEMPERING DIAGRAM



VACUUM HEAT TREATMENT INSTRUCTIONS

Pre-heating	professional heating, 3 pre-heating stages recommended
Vacuum heating	from 1,000 to 1,180 °C see table
Exposure time	from 10 to 30 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	Hardening temperature °C	Exposure time at hardening temperature minutes	Tempering °C
58	1,000	30	560
60	1,050	25	560
62	1,100	15	560
64	1,150	15	560
66	1,180	10	560

The maximum specified hardening temperature of 1,180 °C should not be exceeded.
Hardening with further heat treatment processes is possible, but should be discussed in advance!

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