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全球钢号百科！

Global Steel Grade Encyclopedia

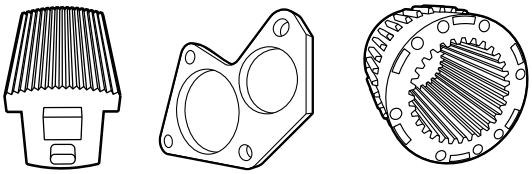
涵盖的行业或国家与地区类别

ASTM INTERNATIONAL 料材料与试验协会
GJB 国家军用标准
SAE INTERNATIONAL 动力机械工程师协会
EU 前欧洲标准化
AISI 美国钢铁学会
DIN 德国工业标准
AMS 空航天材料规范
ISO 国际标准
JASO 日本汽车标准组织
EN 欧洲标准
JB 国机械行业标准
UNS 统一编号系统
UNI 意大利标准
ASME 美国机械工程师协会
SS 瑞典标准
GB 国家标准
JIS 日本工业标准

Z-WEAR PM

Chemical Composition

C	1.1%	Cr	7.8%
Mo	1.6%	V	2.4%
W	1.1%	Si	1.2%



Z-WEAR PM

is an air-hardening semi-high speed steel, developed to meet a wide variety of applications and requirements. Z-Wear PM is made by modern metallurgical melting technique. In comparison to cold work steel D2 (1.2379) and high speed steel M2 (1.3343) Z-Wear PM provides a much higher impact toughness and better wear resistance. The excellent micro-structure with very small and evenly distributed Micro Carbides is responsible for the out-standing cutting edge stability. The typical tool hardness is 58 to 64 HRC. The standard treatment of Z-Wear PM allows a wide range of surface treatments like nitriding and PVD or CVD coating.

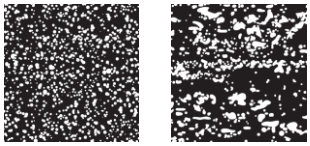
Typical Applications

- Stamping and Forming Tools
- Fineblanking Tools
- Cold Extrusion Dies
- Thread Rolling Dies
- Holepunches
- Shear Blades and Industrial Knifes
- Powder Pressing Tools

READYMILLED.COM

Rectangular sections from 25mm3 up to 430 X 430 X 150mm can be delivered fine milled on all six faces to -
0+0.1mm and with squareness guaranteed to 1mm/m.

POWDER METALLURGICAL AND CONVENTIONAL MICROSTRUCTURE

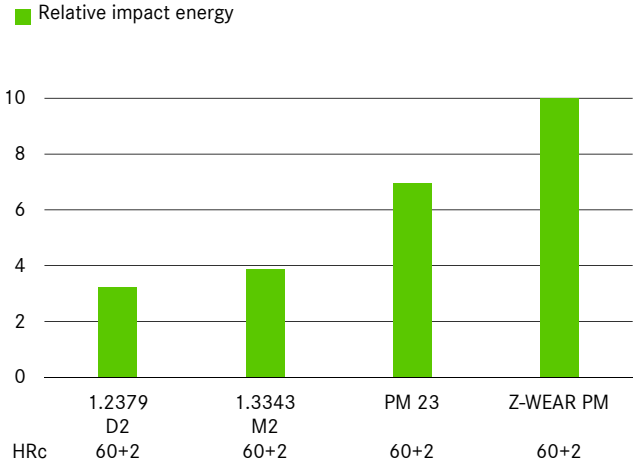


The uniform distribution of carbides in the powder- metallurgical structure compared to conventional tool steels with big carbides and carbide clusters.

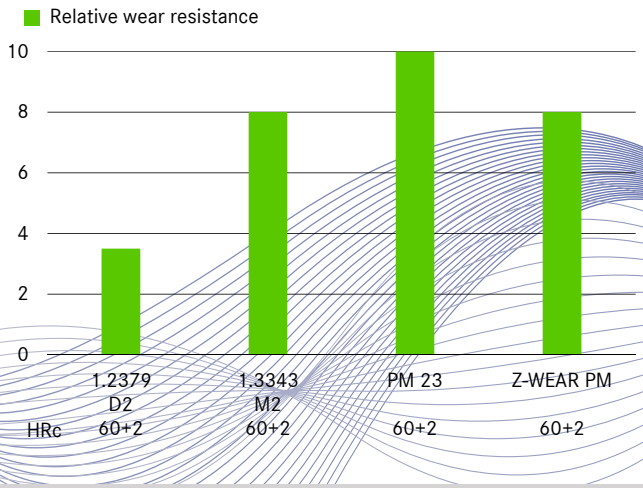
PHYSICAL PROPERTIES

Modulus of elasticity E [GPa]	220
Density [kg/dm³]	7.78
Thermal Conductivity [W/(m*K)]	23.5
Coefficient of thermal expansion [mm/mm/K] over a temperature range of 20-325 °C	11.2 x 10^{-6}

TOUGHNESS



RELATIVE WEAR RESISTANCE



HEAT TREATMENT

Soft Annealing

Z-Wear PM is heated uniformly to 900°C and hold for 2 hours. Followed by cooling to 540°C in the furnace at a cooling rate of 5°C per hour. Then air cool to room temperature. The annealed hardness is about 230 HB.

Stress Relieving

Stress relieving is recommended after rough machining Z-Wear PM is heated to 600-700°C and hold for 2 hours. Followed by cooling to 500°C in the furnace. Then air cool to room temperature.

Hardening

Hardening of Z-Wear PM usually involves the use of two preheating steps according to the table on the right. Depending on furnace and charging, additional preheating steps can be implemented. The material is then rapidly heated from the preheating temperature to the austenitizing temperature of 1010°C 0 1090°C. 1010°C is recommended to reach the highest impact toughness. 1090°C is used for highest hardness. The holding time of 45 minutes should be correspondingly adapted for thick or thin-walled material cross sections.

Quenching

Quenching in air, hot bath or oil is possible. When using vacuum treatment, a quenching pressure of min. 6 bar is needed. To reach the highest toughness level, quenching in hot bath is recommended at approximately 550°C.

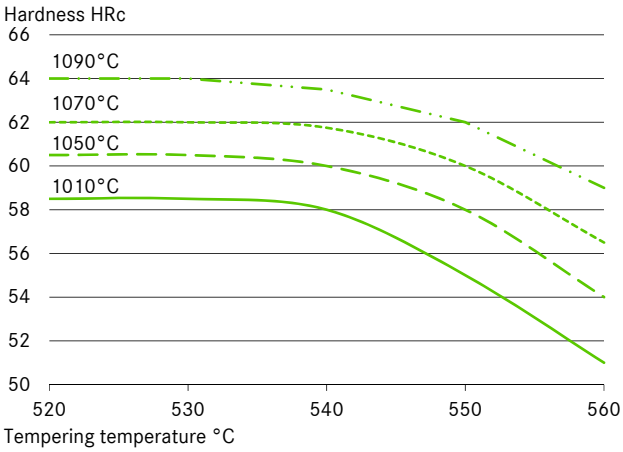
Tempering

Tempering should be carried out immediately after the material has cooled down to below 40g ideal toughness properties, it is recommended to apply the hot bath quenching method. For attaining maximum hardness after quenching the cooling rate between 1000°C and 700°C needs to be maximised in order to minimise distortion in larger section sizes. or when the tool can be held with hamds. Triple tempering with a holding time of 2 hours in each stage at the tempering temperature is necessary. It is important to ensure that the tools are cooled down to room the temperature between the individual tempering stages.

Surface Treatment

Z-Wear PM can be nitrided or PVD/CVD coated.

TEMPERING CHART



HEAT TREATMENT INSTRUCTIONS

1 st preheating	450–500 °C
2 nd preheating	850–900 °C
Hardening	as specified in table
Tempering	3 x each 2 hours as specified in table

Required hardness HRc ± 1*	Hardening temp. °C	Holding time at hardening temp. min**	Tempering °C
58	101	45	540
60	105	45	520
62	107	45	520
64	109	45	530

* Results may vary with hardening method and section size. Salt or oil quenching will give maximum response. Vacuum or atmosphere cooling may result in up to 1-2 HRc points lower.

** Holding time in minutes, depending on tool sizes.

MACHINING DATA

TURNING

Cutting parameter	Turning with cemented carbide medium turning	finish turning	HSS
Cutting speed (V_C) m/min.	70-90	90-130	12-15
Feed (f) mm/U	0.2–0.4	0.05–0.2	0.05–0.3
Cutting depth (a_p) mm	2–4	0.05–2	0.5–3
Tools according ISO	P 10–P 20*	P 10*	–

* Use wear resistant coated cemented carbide, e.g. Coromant 4015 or Seco TP 100.

MILLING

FACE- AND EDGEMILLING

Cutting parameter	Milling with cemented carbide Medium turning	finish turning	HSS
Cutting speed (V_C) m/min.	70-90	90-130	15
Feed (f) mm/U	0.2–0.3	0.1–0.2	0.1
Cutting depth (a_p) mm	2–4	1–2	1–2
Tools according ISO	K 15*	K 15*	–

* Use wear resistant coated cemented carbide, e.g. Coromant 4015 or Seco TP 100.

END MILLING

Cutting parameter	Solid carbide	Milling cutter w. indexable tips	Coated HSS
Cutting speed (V_C) m/min.	20–35	50-80	12*
Feed (f) mm/U	0.01–0.20**	0.06–0.20**	0.01–0.30**
Tools according ISO	K 20	P 25***	–

* for TiCN-coated end mills made of HSS V_C ~ 25-30 m/min.
** depends on radial depth of cut and on milling cutter - diameter
*** Use wear resistant coated cemented carbide, e.g. Coromant 3015 or SECO T15M.

DRILLING

SPIRAL DRILL MADE OF HSS

Driller-⌀ mm	Cutting speed (V_C) m/min.	Feed (f) mm/U
0 – 5	5 - 8*	0.05–0.15
5 –10	5 - 8*	0.15–0.25
10 –15	5 - 8*	0.25–0.35
15 –20	8 – 8*	0.35–0.40

* for TiCN-coated end mills made of HSS V_C ~ 25-30 m/min.

CARBIDE METAL DRILLER

Cutting parameter	Drill type Insert drill	solid carbide tip	Coolant bore driller with carbide tip*
Cutting speed (V_C) m/min.	80–110	40	35
Feed (f) mm/U	0.08–0.14**	0.10–0.15**	0.10–0.20**

* driller with coolant bores and a soldered on carbide tip
** depends on driller-diameter

GRINDING

Grinding method	soft annealed	hardened
Surface grinding, straight grinding wheels	A 13 HV	B 107 R75 B3* 3SG 46 GVS** A 46 GV
Surface grinding	A 24 GV	3SG 36 HVS**
Cylindrical grinding	A 60JV	B126 R75 B3* 3SG 60 KVS** A 60 IV
Internal grinding	A 46 JV	B126 R75 B3* 3SG 80 KVS** A 60 HV
Profile grinding	A 100 LV	B126 R100 B6* 5SG 80 KVS** A 120 JV

* for these applications we recommend CBN-wheels
** grinding wheel from the company Norton Co.