Powder Metallurgy High-Speed Steel

ASP® 2015

ERASTEEL

ASP® 2015 is a high tungsten alloy grade for high performance cutting tools.

STANDARDS

> EN 10027-1: PMHS 12-0-5-5
> EN 10027-2: 1.3251
> ASTM: AISI T15

DELIVERY HARDNESS

> Typical soft annealed hardness is 280 HB
> Cold-drawn material is typically 10-40 HB harder

CHEMICAL COMPOSITION

Safety datasheet available

C	Cr	Mo	W	Co	V
1.62	4.0	-	12.0	5.0	5.0

APPLICATIONS

> End mills
> Hobs
> Shaper cutters
> Broaches

FORM SUPPLIED

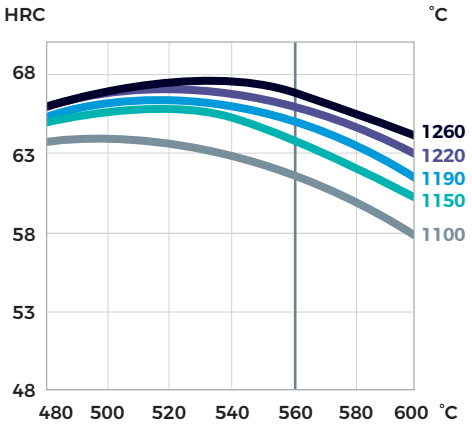
> Coils
> Forged blanks
> Round bars
> Flat & square bars

Available surface conditions: drawn, peeled, hot-worked, cold-rolled, hot-rolled, centerless-ground, rough-machined.

HEAT TREATMENT

> Soft annealing in a protective atmosphere at 850-900˚C for 3 hours, followed by slow cooling at 10˚C/h down to 700˚C, then air cooling.
> Stress-relieving at 600-700˚C for approximately 2 hours, slow cooling down to 500˚C.
> Hardening in a protective atmosphere with pre-heating in 2 steps at 450-500˚C and 850-900˚C and austenitizing at a temperature suitable for chosen working hardness. Cooling down to 40-50˚C.
> Tempering at 560˚C three times for at least 1 hour each time. Cooling to room temperature < 25˚C between temperings.

GUIDELINES FOR HARDENING



PROCESSING

ASP® 2015 can be worked as follows:

> machining (grinding, turning, milling)
> polishing
> hot forming
> electrical discharge machining
> welding (special procedure including preheating and filler materials of base material composition)

GRINDING

During grinding, local heating of the surface, which may alter the temper, must be avoided. Grinding wheel manufacturers can provide advice on the choice of grinding wheels.

SURFACE TREATMENT

The steel grade is a perfect substrate material for PVD coating. If nitriding is requested, a small diffusion zone is recommended but avoid compound and oxidized layers.

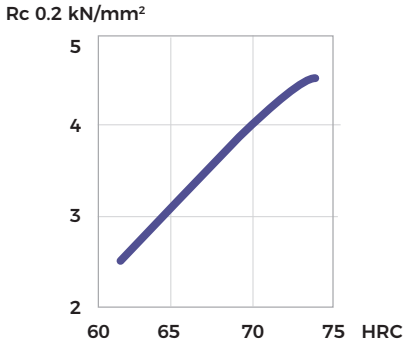
PROPERTIES

PHYSICAL PROPERTIES

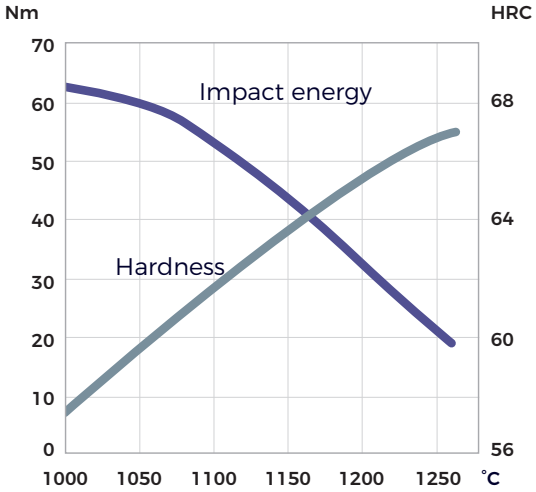
Temperature	20˚C	400˚C	600˚C
Density g/cm³ (1)	8.2	8.1	8.0
Modulus of elasticity kN/mm² (2)	245	220	195
Thermal expansion ratio per ˚C (2)	-	$11.0x10^{-6}$	$11.7x10^{-6}$
Thermal conductivity W/m˚C (2)	24	28	27
Specific heat J/kg˚C (2)	420	510	600

(1) Soft annealed
(2) Hardened 1180˚C and tempered 560˚C, 3 x 1 hour

COMPRESSION YIELD STRESS



IMPACT TOUGHNESS



Hardening temperature in ˚C

Original dimension 9 x 12 mm
Tempering 3 x 1 hour at 560˚ C
Unnotched test piece 7 x 10 x 55 mm

COMPARATIVE PROPERTIES