Powder Metallurgy High-Speed Steel

ASP® 2042

ERASTEEL

ASP® 2042 is a Powder Metallurgy High-Speed Steel grade with high hardness and high toughness. It is an upgraded material in particular in applications where standard M42 is traditionally used e.g. for laser-welded bi-metal saws with improve saw performance, thanks to its higher hardness and toughness. It is also recommended for high performance components.

STANDARDS

> EN 10027-1: PMHS 2-9-1-8

> EN 10027-2: 1.3247

> ASTM: AISI M42

> JIS: SKH59

DELIVERY HARDNESS

> Typical soft annealed hardness is 270 HB

> Cold-drawn and cold-rolled material is typically 10-40 HB harder

CHEMICAL COMPOSITION

Safety datasheet available

C	Cr	Mo	W	Co	V
1.08	3.8	9.4	1.6	8.0	1.2

APPLICATIONS

> Bandsaws, jig & sabre saws, hole saws

> High performance components

> Flat thread rolling dies for screws and bolts

> Cold forming dies for screws and bolts

FORM SUPPLIED

> Bi-metal edge wire

> Round bars

> Flat bars

HEAT TREATMENT

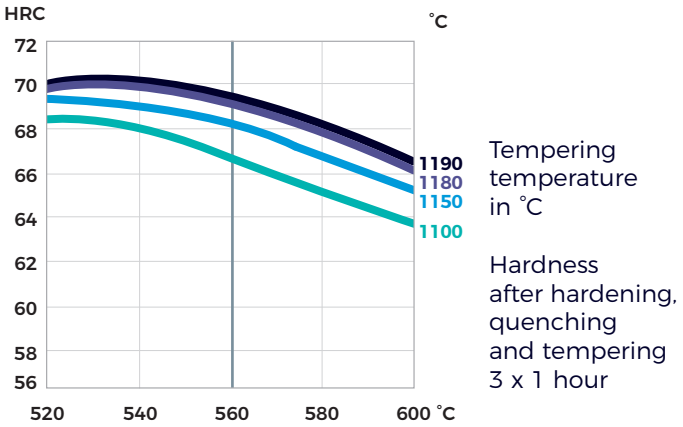
> Soft annealing in a protective atmosphere at 850-900˚C for 3 hours, followed by slow cooling at 10˚C/h down to 700˚C, then air cooling.

> 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



Tempering temperature in ˚C

Hardness after hardening, quenching and tempering 3 x 1 hour

PROCESSING

ASP® 2042 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.

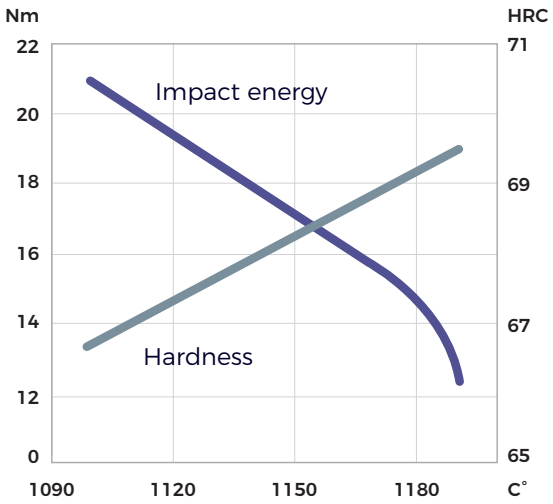
PROPERTIES

PHYSICAL PROPERTIES

Temperature	20˚C	400˚C	600˚C
Density g/cm³ (1)	8.0	7.9	7.9
Modulus of elasticity kN/mm² (2)	225 33x10⁶	200 29x10⁶	180 26x10⁶
Thermal expansion ratio per ˚C (2)	-	11.5x10⁻⁶	11.8x10⁻⁶
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

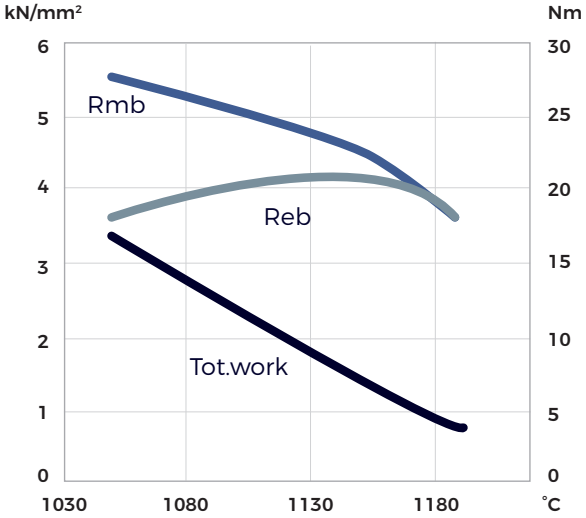
IMPACT TOUGHNESS



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

4-POINT BEND STRENGTH

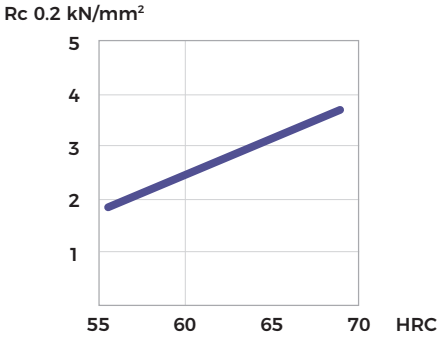


Hardening temperature in ˚C

Original dimension Ø 6 mm
Tempering 3 x 1 hour at 560˚C
Dimension of test piece Ø 4.7 mm

Rmb = Ultimate bend strength in kN/mm²
Reb = Bend yield strength in kN/mm²
Tot. work = Total work in Nm

COMPRESSION YIELD STRESS



COMPARATIVE PROPERTIES