ERASTEEL

ASP®2012

Powder metallurgy HSS

For more information relative to cold work applications, find the ASP®2012 brochure on our website: Applications > Cold work.

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo	W	V
0.60	1.0	0.3	4.0	2.0	2.1	1.5

SAFETY DATA SHEET SDS: A

STANDARDS

- Europe: HS 2-2-2
- Germany: 1.3397

DELIVERY HARDNESS

- Typical soft annealed hardness is 230 HB.

DESCRIPTION

ASP®2012 is the best in class for high toughness up to 62-63 HRC in plastic, cold, warm, and hot applications.

APPLICATIONS

- Cold work tools: powder compacting tools, cold extrusion tools, cold-heading dies, fine blanking tools.
- Plastic injection: mould for fibers reinforced plastics, broaches and injector pins.
- Machine components and rolls.
- Warm and hot-work applications: extrusion dies, forging dies and punches, press hardening tools.

FORM SUPPLIED

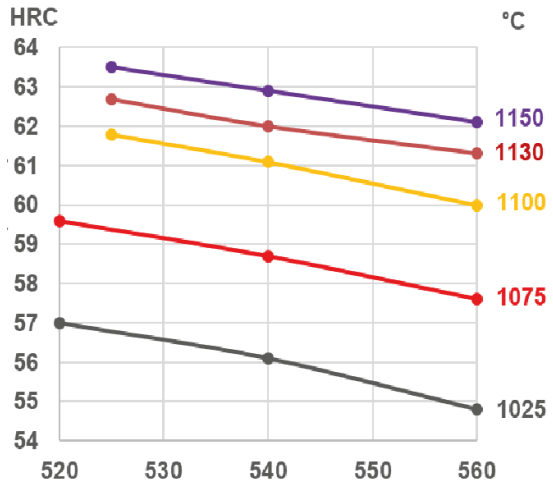
- Round bars
- Flat bars

Available surface conditions: drawn, peeled, 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 preheating in 2 steps at 450-500°C and 850-900°C and austenitising at a temperature suitable for chosen working hardness. Cooling down to 40-50°C.
- The temperature tempering range from 520 to 560°C, depending on the hardening temperature, the application and the targeted hardness (55 to 63 HRC). Cooling to room temperature between tempering.

GUIDELINES FOR HARDENING



Tempering temperature in °C
Hardness after hardening, quenching and tempering 3x1 hour

ASP®2012 has a good flexibility in heat treatment with hardening temperatures commonly used for cold work tool steel applications.
To achieve the optimal hardness and toughness combination we recommend tempering at 560°C.
For a hardness above 58 HRC, do not hesitate to contact our technical support to define the best heat treatment process for the application.

PROCESSING

ASP®2012 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.

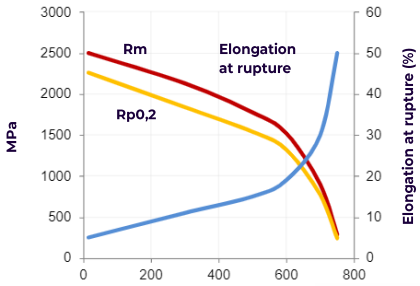
PROPERTIES

PHYSICAL PROPERTIES

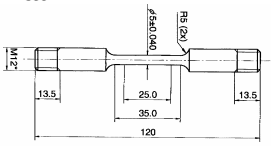
Temperature	20°C	400°C	600°C
Density g /cm³ *(1)*	7.8	7.7	7.6
Modulus of elasticity kN/mm² *(2)*	220	195	175
Coefficient of thermal expansion from 20°C, per °C *(2)*	-	$12.1x10^{-6}$	$12.7x10^{-6}$
Thermal conductivity W/m°C *(2)*	26	30	30
Specific heat J/kg °C *(2)*	420	510	600

(1)=Soft annealed
(2)=Hardened 1100°C and tempered 560°C, 3x1 hour

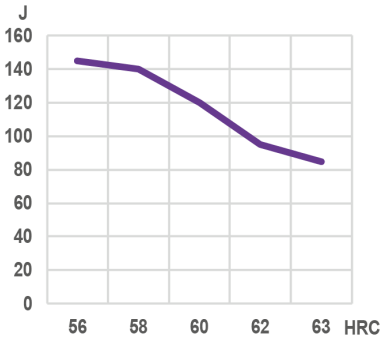
TENSILE STRENGTH



Test temperature in °C
Size of blank Ø15mm
Test piece dimensions are given below.
Hardness 58 HRC

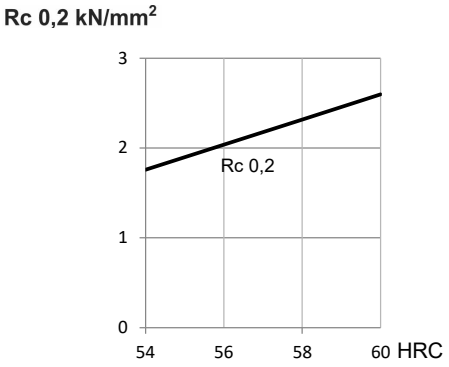


IMPACT TOUGHNESS

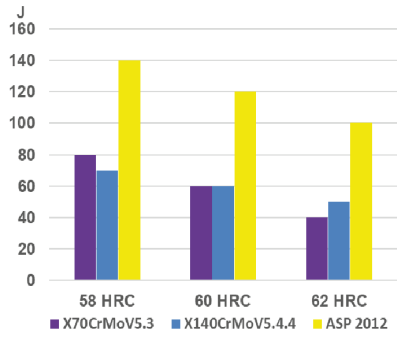


Hardening temperature in °C
Original dimension Ø 118 mm
Tempering 3 x 1 hour at 560° C
Unnotched test piece 7 x 10 x 55 mm
Transverse direction

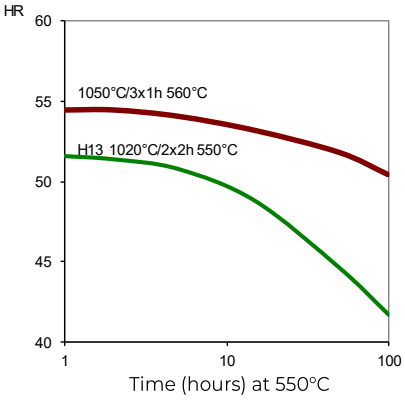
COMPRESSION YIELD STRESS



TOUGHNESS COMPARISONS



TEMPERING RESISTANCE



COMPARATIVE PROPERTIES

Grade	Abrasive wear resistance	Adhesive wear resistance	Chipping/ cracking resistance	Compressive strenght	Polishability
ASP®2012					
X160CDV12 / D2					
X70CrMoV5.2					
X50CrMoV5.2					
H11 / H13					