

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

STANDARDS

- > EN 10027-1: PMHS 2-2-2
- > EN 10027-2: 1.3397

DELIVERY HARDNESS

- > Typical soft annealed hardness is 220 HB

CHEMICAL COMPOSITION

Safety datasheet available

C	Cr	Mo	W	Co	V
0.60	4.0	2.0	2.1	-	1.5

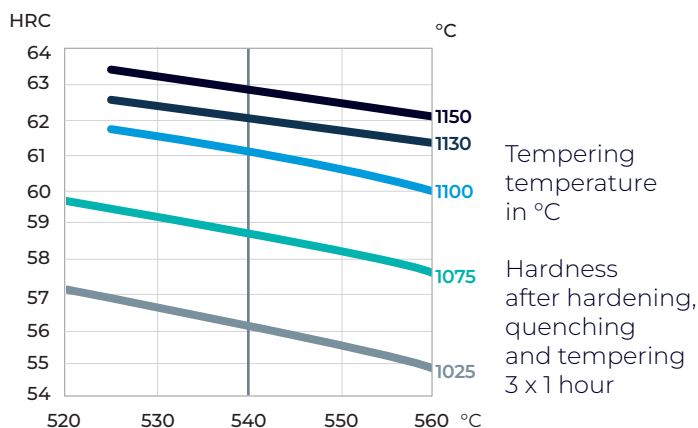
APPLICATIONS

- > 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

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 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



FORM SUPPLIED

- > Round bars
- > Flat bars

Available surface conditions: drawn, peeled, rough-machined.

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.

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.

PROPERTIES

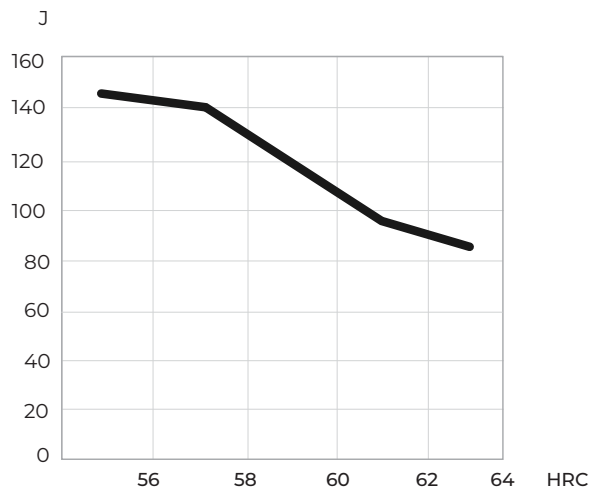
PHYSICAL PROPERTIES

Temperature	20°C	400°C	600°C
Density g/cm ³ ⁽¹⁾	7.8	7.7	7.6
Modulus of elasticity kN/mm ² ⁽²⁾	220	195	175
Thermal expansion ratio 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, 3 x 1 hour

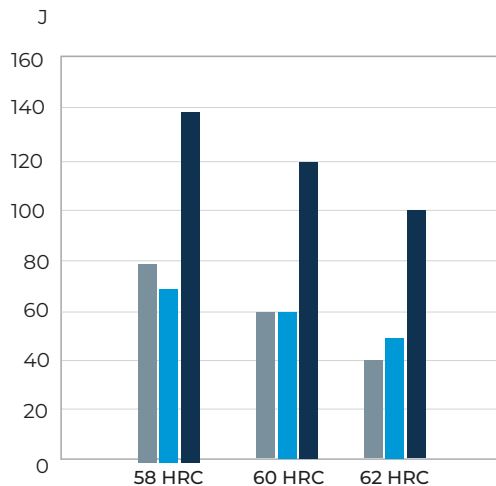
IMPACT TOUGHNESS



Hardening temperature in °C

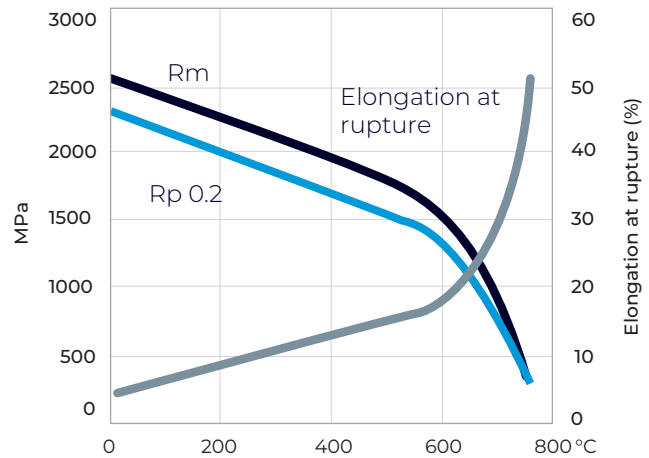
Original dimension Ø 118 mm
Tempering 3 x 1 hour at 560° C
Unnotched test piece 7 x 10 x 55 mm
Transverse direction

TOUGHNESS COMPARAISON



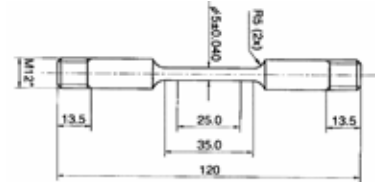
■ X70CrMoV5.3
■ X140CrMoV5.4.4
■ ASP® 2012

TENSILE STRENGTH

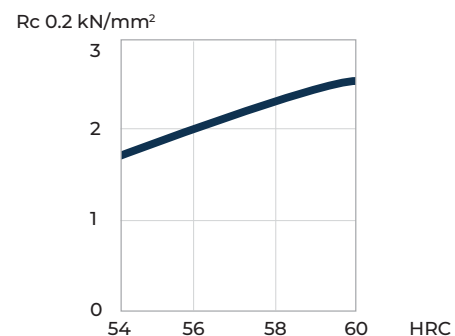


Test temperature in °C

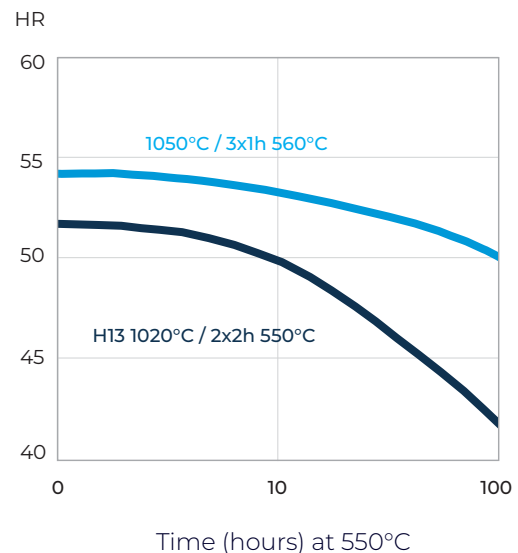
Size of blank Ø15mm
Test piece dimensions
are given in the
drawing on the right.
Hardness 58 HRC



COMPRESSION YIELD STRESS



TEMPERING RESISTANCE





COMPARATIVE PROPERTIES

