

**ASP® 2078 is a highly alloyed grade for applications needing high hardness, high hot hardness and wear resistance. Sulfur addition gives it an improved machinability.**

## STANDARDS

- > EN 10027-1 : PMHS 7-7-7-11S
- > EN 10027-2 : 1.3292

## DELIVERY HARDNESS

- > Typical soft annealed hardness is 340 HB

## CHEMICAL COMPOSITION

Safety datasheet available

C	Cr	Mo	W	Co	V	S
2.30	4.2	7.0	6.5	10.5	6.5	0.23

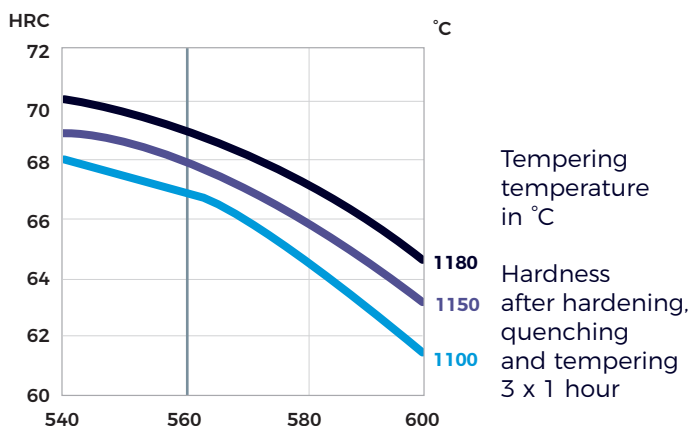
## APPLICATIONS

- > Hobs
- > Shaper cutters
- > Milling cutters

## 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



## FORM SUPPLIED

- > Round bars

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

## PROCESSING

ASP® 2078 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.



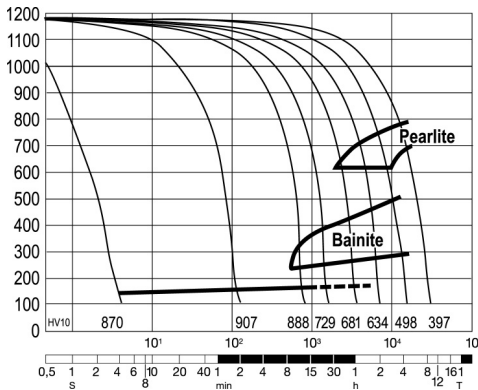
**PROPERTIES**

**PHYSICAL PROPERTIES**

Temperature	20 °C	400 °C	600 °C
Density g/cm <sup>3</sup> (1)	7.9	7.9	7.8
Modulus of elasticity kN/mm <sup>2</sup> (2)	250	222	200
Thermal expansion ratio per °C (2)	-	10.6x10 <sup>-6</sup>	11.1x10 <sup>-6</sup>
Thermal conductivity W/m °C (2)	24	28	27
Specific heat J/kg °C (2)	420	510	600

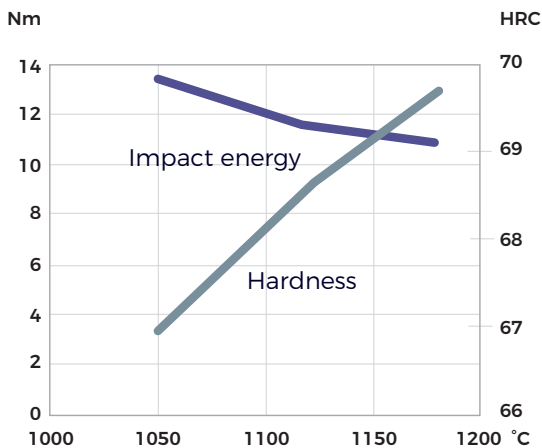
(1) Soft annealed  
 (2) Hardened 1180°C and tempered 560°C, 3 x 1 hour

**CCT CURVE**



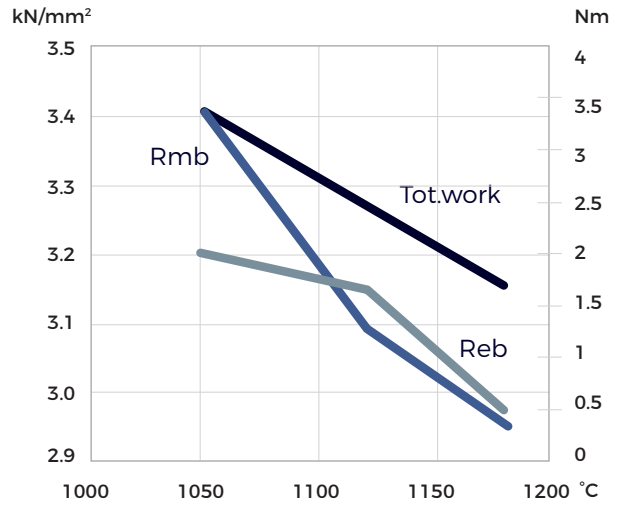
Continuous cooling transformation curve  
 Hardening temperature 1150°C

**IMPACT TOUGHNESS**



Hardening temperature in °C  
 Original dimension Ø 101 mm  
 Tempering 3 x 1 hour at 560°C  
 Unnotched test piece 7 x 10 x 55 mm

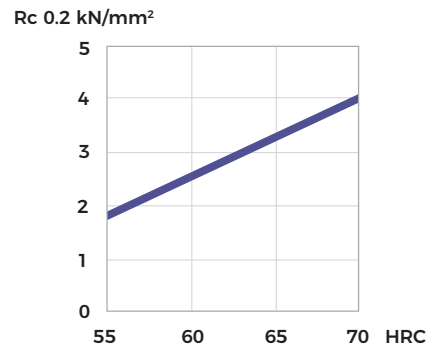
**4-POINT BEND STRENGTH**



Hardening temperature in °C  
 Original dimension Ø 101 mm  
 Tempering 3 x 1 hour at 560°C  
 Dimensions of test piece Ø 4.7 mm

Rmb = Ultimate bend strength in kN/mm<sup>2</sup>  
 Reb = Bend yield strength in kN/mm<sup>2</sup>  
 Tot. work = Total work in Nm

**COMPRESSION YIELD STRESS**



## COMPARATIVE PROPERTIES

