

## CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V	Nb
1.08	4.0	2.5	2.5	-	1.8	1.8

SAFETY DATA SHEET AVAILABLE

## DELIVERY HARDNESS

- Typical soft annealed hardness is 260 HB.
- Cold drawn and cold rolled material is typically 10-40 HB harder.

## DESCRIPTION

ASP<sup>®</sup>2008 is a powder metallurgical tool steel whose unique analysis takes it to a new step by achieving a very good compromise between impact resistance, compressive strength and adhesive/abrasive wear resistance up to 64 HRC.

## APPLICATIONS

ASP<sup>®</sup>2008 is particularly recommended for tools that suffer mainly from mixed adhesive/abrasive wear and chipping/cracking. Such failure mechanism can occur with processed materials such as aluminium, austenitic stainless steels, mild steels, copper and with thick and/or Ultra High Strength Steels.

ASP<sup>®</sup>2008 is especially efficient in the below mentioned applications:

- cold forging
- blanking and forming
- fine blanking
- powder compaction
- minting of coins
- rolling rolls
- rotary cutters
- slitting knives
- granulator knives
- encapsulation

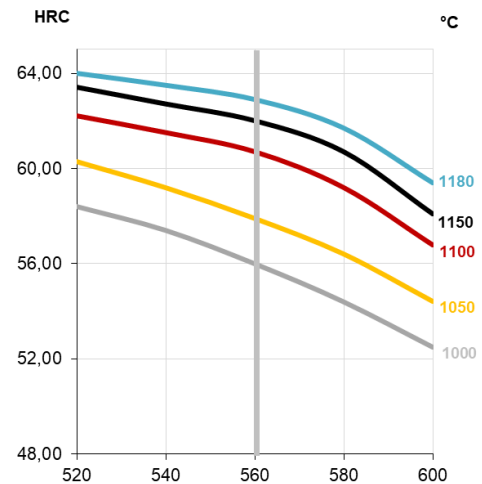
## FORM SUPPLIED

- flat & square bars
- round 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 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.
- 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 3x1 hour

## PROCESSING

ASP<sup>®</sup>2008 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**

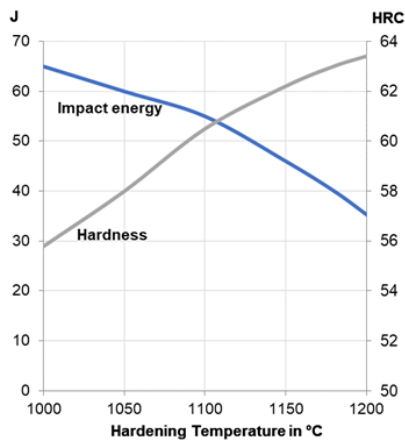
**PHYSICAL PROPERTIES**

Temperature	20°C	400°C	600°C
Density g /cm <sup>3</sup> (1)	7.9	7.8	7.7
Modulus of elasticity kN/mm <sup>2</sup> (2)	220	195	175
Thermal expansion ratio per °C (2)	11.0x10 <sup>-6</sup>	13.2x10 <sup>-6</sup>	12.7x10 <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

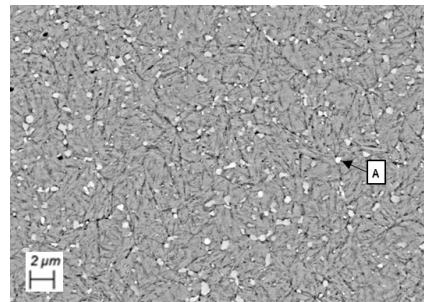
**IMPACT TOUGHNESS**



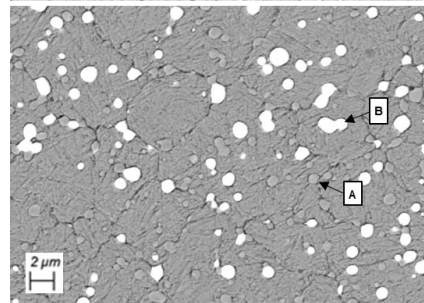
Original dimension Ø 80 mm  
 Tempering 3 x 1 hour at 560°C  
 Unnotched test piece 7 x 10 x 55 mm  
 Tested transversal to the bar length

**MICROSTRUCTURE**

Microstructure comparison of ASP®2008 and ASP®2023



**ASP®2008**



**ASP®2023**

A: MC  
 B: M<sub>6</sub>C

Alloyed with Nb, ASP®2008 has an outstanding fine and even carbide distribution. Nb gives smaller MC carbides and this is very positive for:

- a better machinability and grindability
- higher surface finish after polishing
- less galling and a good adhesive wear resistance (aluminium, austenitic stainless steels, etc.)
- reduce the grain growth during heat treatments which lead to a better impact resistance
- the abrasive wear resistance thanks to the very hard Nb carbides

**COMPARATIVE PROPERTIES**

