

## CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V	Nb
1.69	4.0	4.6	6.3	9.0	3.2	2.1

SAFETY DATA SHEET SDS: B

## STANDARDS

- Not yet standardised

## DELIVERY HARDNESS

- Typical soft annealed hardness is 320 HB
- Cold drawn and cold rolled material is typically 10-40 HB harder

## DESCRIPTION

ASP<sup>®</sup>2055 is a high alloyed grade with a refined carbide structure for high demanding cutting tools and cold work applications like fine blanking requiring high hardness.

## APPLICATIONS

- Hobs
- Shaper cutters
- Broaches
- End mills
- Taps
- Cold work
- Fine blanking

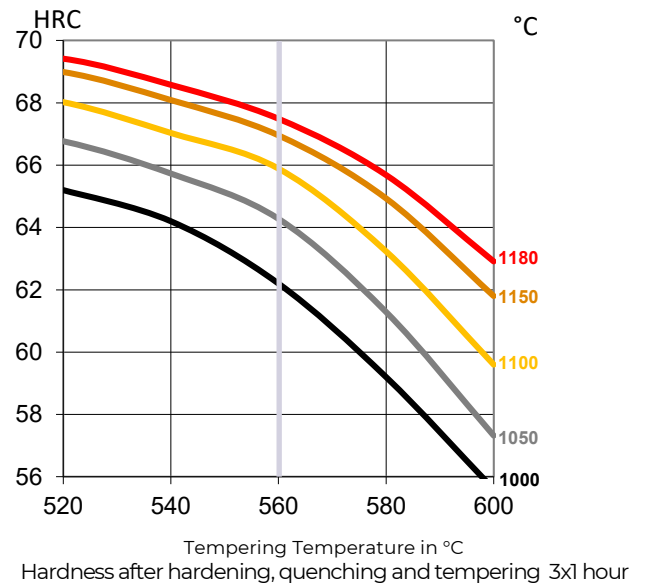
## FORM SUPPLIED

- Peeled bars
- Drawn & Ground 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 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



## PROCESSING

ASP<sup>®</sup>2055 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.

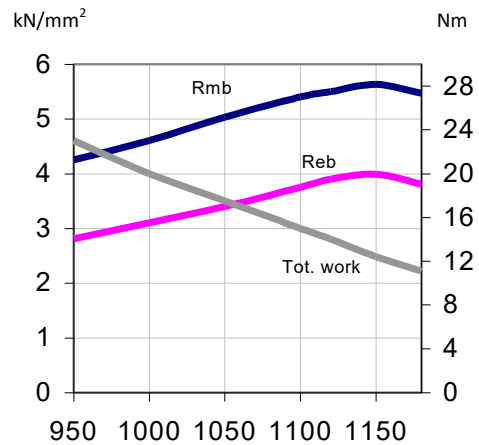
PROPERTIES

PHYSICAL PROPERTIES

Temperature	20°C	400°C	600°C
Density g /cm <sup>3</sup> (1)	8.0	7.9	7.9
Modulus of elasticity kN/mm <sup>2</sup> (2)	240	214	192
Thermal expansion ratio per °C (2)	-	11.8x10 <sup>-6</sup>	12.3x10 <sup>-6</sup>
Thermal conductivity W/m°C (2)	24	28	27
Specific heat J/kg °C (2)	420	510	600

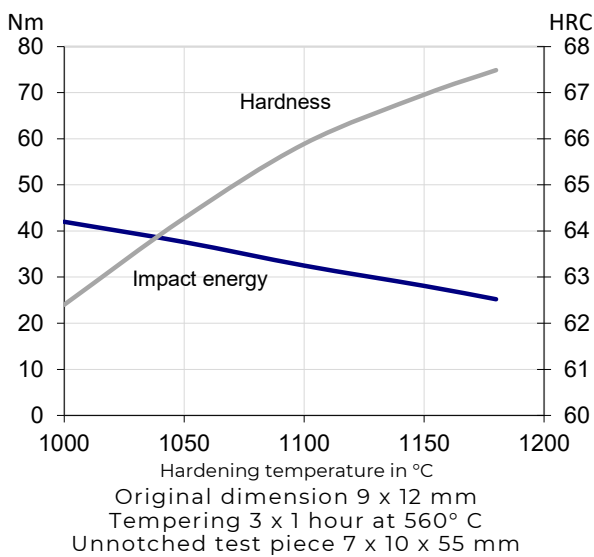
(1)=Soft annealed  
 (2)=Hardened 1180°C and tempered 560°C, 3x1 hour

4-POINT BEND STRENGTH



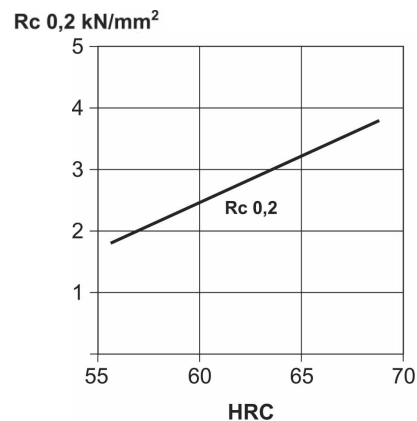
Hardening Temperature in °C  
 Original dimension Ø 7.5 mm  
 Tempering 3 x 1 hour at 560°C  
 Dimension of test piece Ø 4.7 mm  
 Rmb = Ultimate bend strength in kN/mm<sup>2</sup>  
 Reb = Bend yield strength in kN/mm<sup>2</sup>  
 Tot. work = Total work in Nm

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

COMPRESSION YIELD STRESS



COMPARATIVE PROPERTIES

