

## CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V	Nb
0.80	4.0	3.0	3.0	8.0	1.0	1.0

SAFETY DATA SHEET SDS: B

## STANDARDS

- Europe: HS 3-3-1-8
- Germany: 1.3288

## DELIVERY HARDNESS

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

## DESCRIPTION

ASP®2017 is a grade with high toughness, wear resistance and excellent grindability for cold-warm and hot applications.

## APPLICATIONS

- Cold work tools .
- Plastic injection moulds, broaches and injector pins.
- Machine components and rolls.
- Warm- and hot-work applications
- Taps
- Bi-metal saws
- Roughing end mills

## FORM SUPPLIED

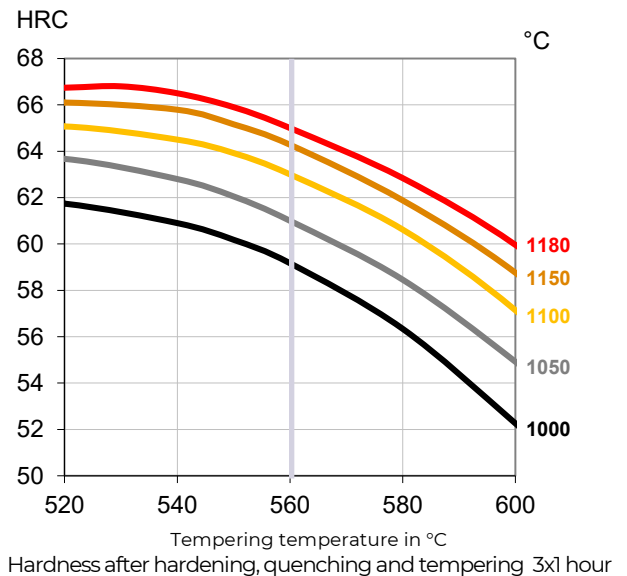
- Round bars
- Flat & square bars

Available surface conditions: drawn, ground, hot-worked, peeled, rough machined, cold rolled, hot rolled.

## 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®2017 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.

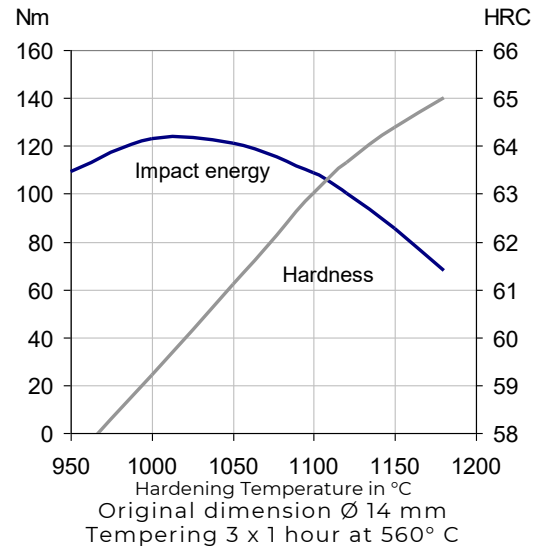
# PROPERTIES

## PHYSICAL PROPERTIES

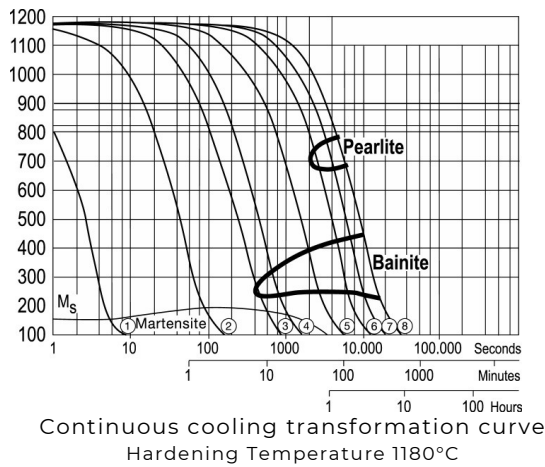
Temperature	20°C	400°C	600°C
Density g /cm <sup>3</sup> (1)	8.0	7.9	7.8
Modulus of elasticity kN/mm <sup>2</sup> (2)	235	210	190
Thermal expansion ratio per °C (2)	-	12.1x10 <sup>-6</sup>	12.7x10 <sup>-6</sup>
Thermal conductivity W/m°C (3)	20	27.5	29
Specific heat J/kg °C (2)	420	510	600

(1)=Soft annealed  
 (2)=Hardened 1180°C and tempered 560°C, 3x1 hour  
 (3)=Hardened 1100°C and tempered 560°C, 3x1 hour

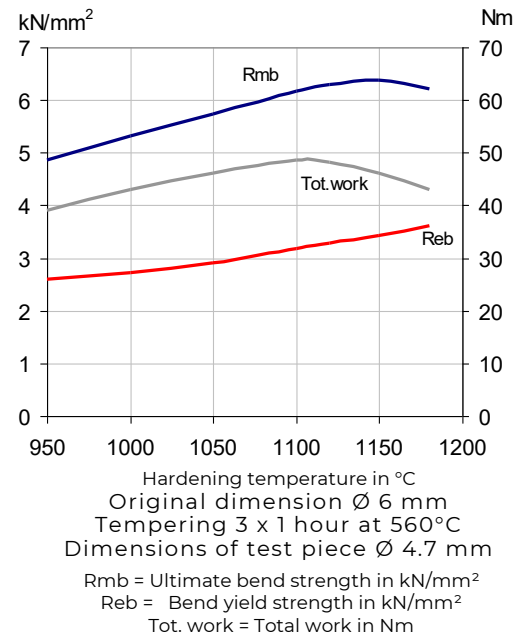
## IMPACT TOUGHNESS



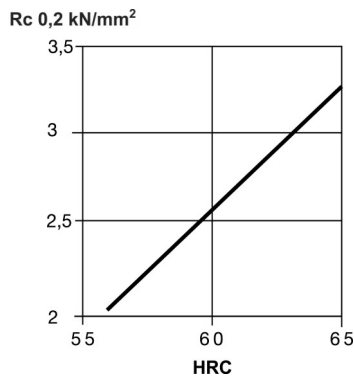
## CCT CURVE



## 4-POINT BEND STRENGTH



## COMPRESSION YIELD STRESS



## COM-

## PARATIVE PROPERTIES

