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# 全球钢号百科!

Global Steel Grade Encyclopedia



涵盖的行业或国家与地区类别



国材料与试验协会

GJB

国家军用标准



动力机械工程师协会

EU

前欧洲标准化

AISI

美国钢铁学会



德国工业标准

AMS

航空航天材料规范



国际标准

JASO

日本汽车标准组织

EN

欧洲标准

JB

机械行业标准

UNS

统一编号系统

UNI

意大利标准



美国机械工程师协会

SS

瑞典标准



国家标准



日本工业标准

## CHEMICAL COMPOSITION

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

SAFETY DATA SHEET SDS: B

## STANDARDS

- Europe: PMHS 7-7-7-11
- Germany: 1.3292

## DELIVERY HARDNESS

- Typical soft annealed hardness is 345 HB

## DESCRIPTION

ASP®2060 is a very high alloyed grade for applications requiring both hot hardness and wear resistance.

## APPLICATIONS

- Gear cutting tools
- Broaches
- Cold work tools
- Bearing & other Components
- Taps
- Drills
- End mills

## FORM SUPPLIED

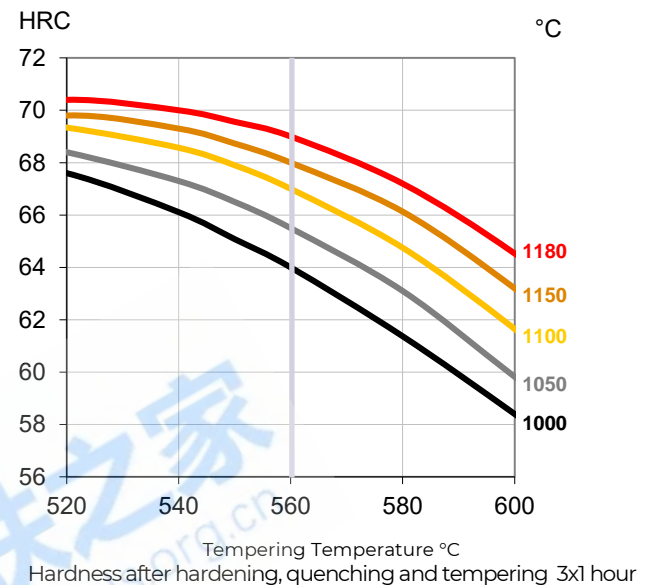
- Round bars
- Forged bars
- Flat & square bars
- Tool bit sections

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

## 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



## PROCESSING

ASP®2060 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**

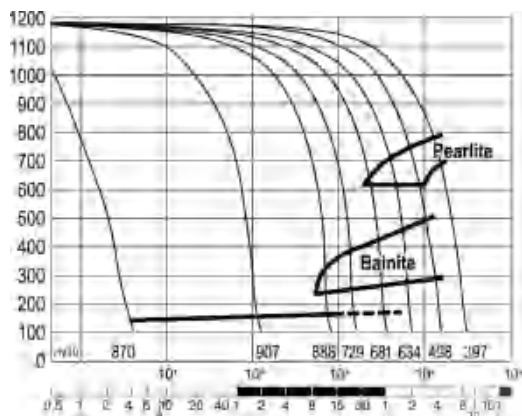
**PHYSICAL PROPERTIES**

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

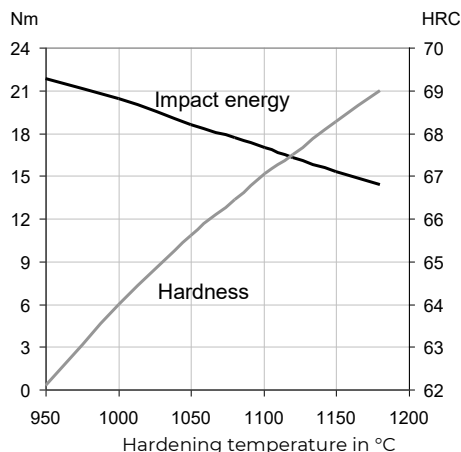
(2)=Hardened 1180°C and tempered 560°C, 3x1 hour

**CCT CURVE**



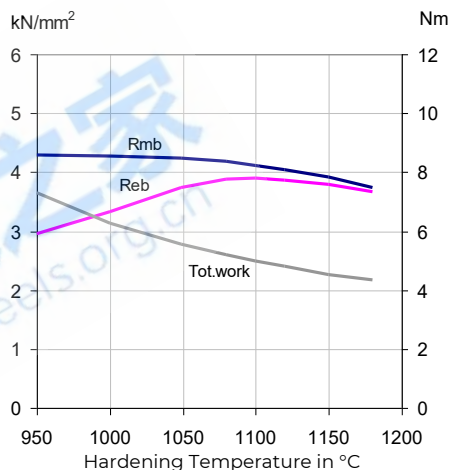
Continuous cooling transformation curve  
Hardening Temperature 1180°C

**IMPACT TOUGHNESS**



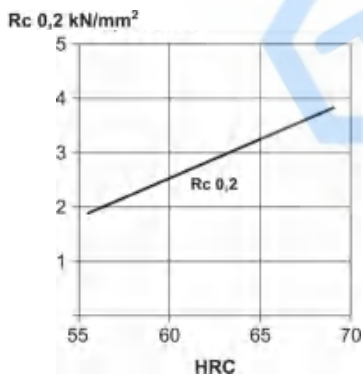
Original dimension 9 x 12 mm  
Tempering 3 x 1 hour at 560° C  
Unnotched test piece 7 x 10 x 55 mm

**4-POINT BEND STRENGTH**



Original dimension Ø 6 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**

