

## CHEMICAL COMPOSITION

C	Cr	Mo	W	V
2.48	4.20	3.10	4.20	8.00

## STANDARDS

- Europe: HS 4-3-8
- Germany: 1.3352

## DELIVERY HARDNESS

Soft annealed	max. 300 HB
Cold drawn	max. 340 HB
Cold rolled	max. 340 HB

## DESCRIPTION

ASP®2053 is a high V-alloyed grade with excellent abrasive wear resistance and toughness.

## APPLICATIONS

- Cold work tools
- Wood tools
- Paper cutting knives
- Stamping
- Textile knives
- Fine blanking
- Extrusion
- Rolls

## FORM SUPPLIED

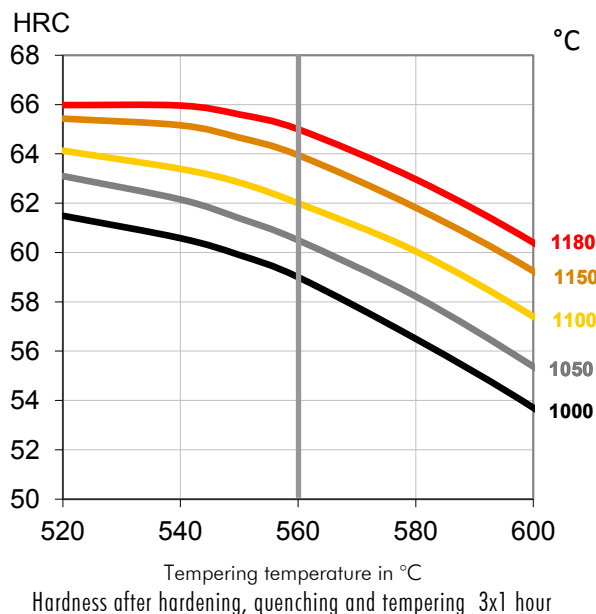
- Coils
- Round bars
- Forged blanks
- Flat & square bars
- Sheets
- Discs

Available surface conditions: drawn, ground, peeled, rough machined, 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 at a temperature suitable for chosen working hardness. Pre-heating in 2 or 3 steps depending on tool dimension-design and austenitising temperature, last step 50°C below chosen austenitising temperature. 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®2053 can be worked as follows :

- Machining (grinding, turning, milling)
- Polishing
- Plastic 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 furnish advice on the choice of grinding wheels.

## SURFACE TREATMENT

The steel grade is a good substrate material for PVD and CVD coating. If nitriding is requested a small zone of 2-15 µm is recommended. The steel grade can also be steam-tempered if so desired.



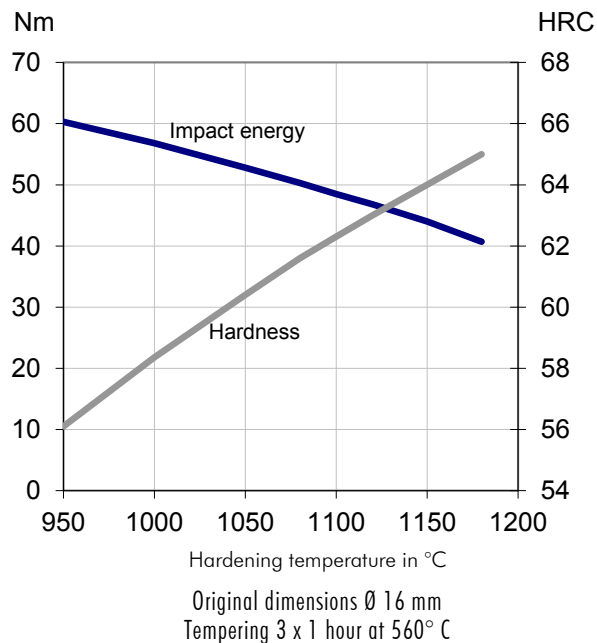
PHYSICAL PROPERTIES

Temperature	20°C	400°C	600°C
Density g /cm <sup>3</sup> (1)	7.7	7.6	7.5
Modulus of elasticity kN/mm <sup>2</sup> (2)	250	220	200
Thermal expansion coefficient from 20°C per °C (2)	-	12,1x10 <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

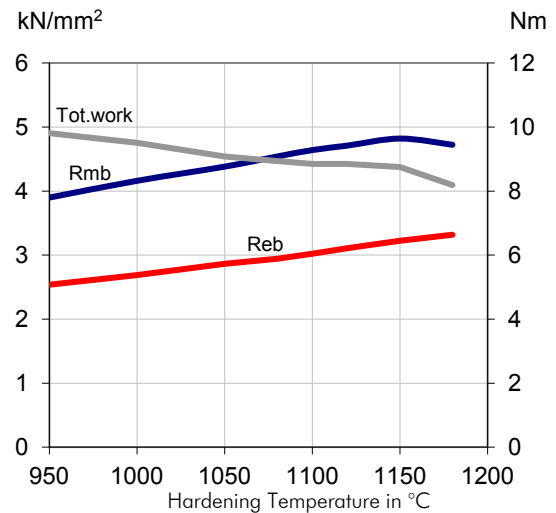
(1) = Soft annealed

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

IMPACT ENERGY



4-POINT BEND STRENGTH



Original dimensions Ø 16 mm

Tempering 3 x 1 hour at 560°C

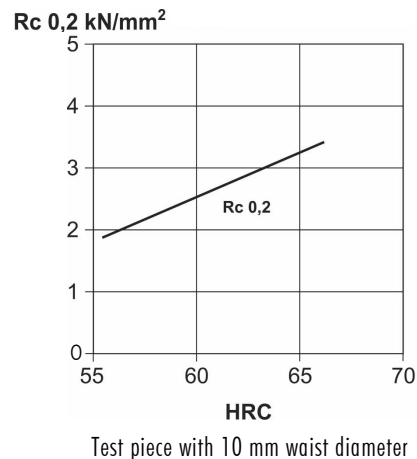
Dimensions of test piece Ø 4.7 mm

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

