High speed steel

C8

CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V
1.05	4.0	6.0	5.0	7.8	1.6

STANDARDS

- Europe: HS 5-6-2-8

DELIVERY HARDNESS

Soft annealed	max. 280 HB
Cold drawn	max. 320 HB
Cold rolled	max. 320 HB

DESCRIPTION

C8 is a conventionally manufactured cobalt-alloyed high speed steel, characterised by a high resistance to high temperatures, a very high hardness, an excellent toughness and bending capability.

APPLICATIONS

- End mills
- Milling cutters
- Twist drills

FORM SUPPLIED

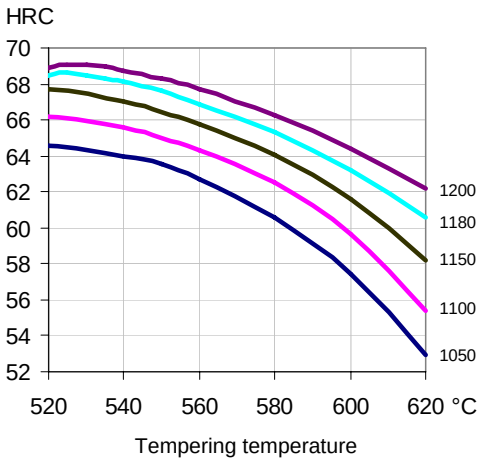
- Round bars
- Flat bars
- Square bars

Available surface conditions: drawn, ground, peeled, hot rolled, turned.

HEAT TREATMENT

- Soft annealing in a protective atmosphere at 850-900°C for 3 hours, followed by slow cooling 10°C per hour down to 700°C, then air cooling.
- Stress-relieving at 600°C to 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.
- 3 tempers at 560°C are recommended with at least 1 hour holding time each time.

GUIDELINES FOR HARDENING



Hardness after hardening, quenching and tempering 3 x 1 hour

Tool	Hardening	Tempering
Single-edge cutting tools	1200°C	550-570°C
Multi-edge cutting tools	1150-1180°C	550-570°C
Cold work tools	1050-1150°C	550-570°C

ERASTEEL

PROCESSING

C8 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 can alter the microstructure, must be avoided. Grinding wheel manufacturers can supply advice on the choice of grinding wheels.

SURFACE TREATMENT

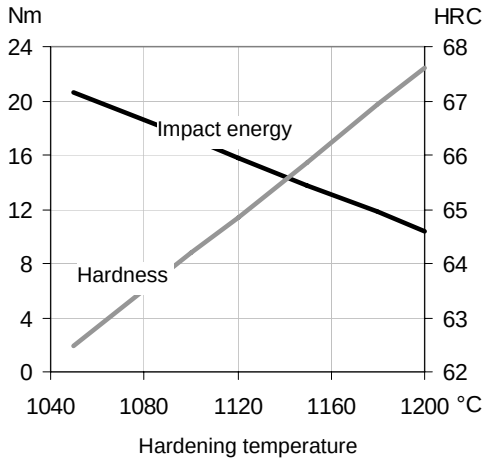
The steel grade is a good substrate material for PVD and CVD coating. If nitriding is requested a small zone of 2-15 µm is recommended. The steel grade can also be steam-tempered if so desired.

PROPERTIES

PHYSICAL PROPERTIES

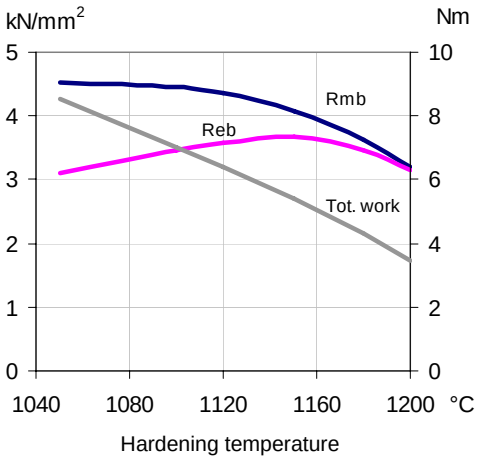
	Temperature		
	20°C	**400°C**	**600°C**
Density g/cm³	8.1	8.0	7.9
Modulus of elasticity kN/mm²	230	205	184
Thermal expansion ratio per °C	-	11.5×10^{-6}	11.8×10^{-6}
Thermal conductivity W/m° C	24	28	27
Specific heat J/kg °C	420	510	600

IMPACT STRENGTH



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

4-POINT BEND STRENGTH



Tempering 3 x 1 hour at 560°C
Dimension of test piece ∅ 4.7 mm

Rmb = Ultimate bend strength in kN/mm²
Reb = Bend yield strength in kN/mm²
Tot. work = Total work in Nm

COMPARATIVE PROPERTIES