

### CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V
0.91	3.7	5.0	1.8	2.5	1.2

### STANDARDS

- Europe: HS 2-5-1-3
- Sweden: SS2737

### DELIVERY HARDNESS

- Typical soft annealed hardness is 250 HB
- Cold drawn and cold rolled material is typically 10-40 HB harder

### DESCRIPTION

E 945 is a high speed steel with a low alloy content compensated by an optimal ratio of carbon-vanadium which gives a very hard martensitic matrix. Hot hardness is improved with 2.5% cobalt. This steel allows for lower austenitizing temperatures to reach the same hardness.

### APPLICATIONS

- Twist drills
- Broaches
- Reamers
- Taps
- End mills
- Saws
- Countersinks

### FORM SUPPLIED

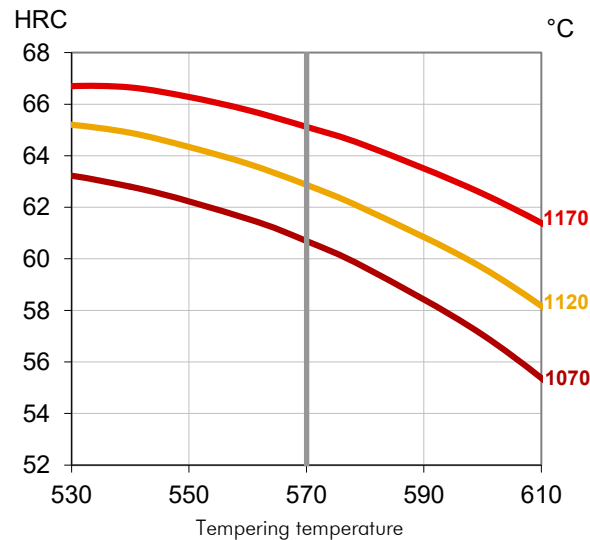
- Drawn wire
- Square bars
- Round bars
- Strips
- Flat bars

Available surface conditions: drawn, ground, rolled, hot rolled, cold rolled, peeled, 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 570°C are recommended with at least 1 hour holding time each time.

### GUIDELINES FOR HARDENING



Hardness after hardening, quenching and tempering 3x1 hour

Tool	Hardening	Tempering
Single-edge cutting tools	1170°C	570°C
Multi-edge cutting tools	1120°C	570°C
Cold work tools	1070-1160°C	570-580°C

### PROCESSING

E 945 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 can alter the temper, must be avoided. Grinding wheel manufacturers can provide advice on the choice of grinding wheels.

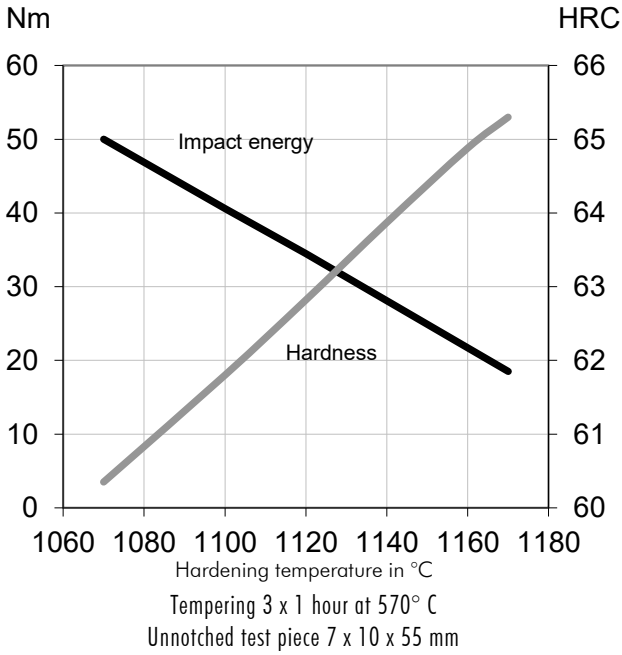
### SURFACE TREATMENT

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.

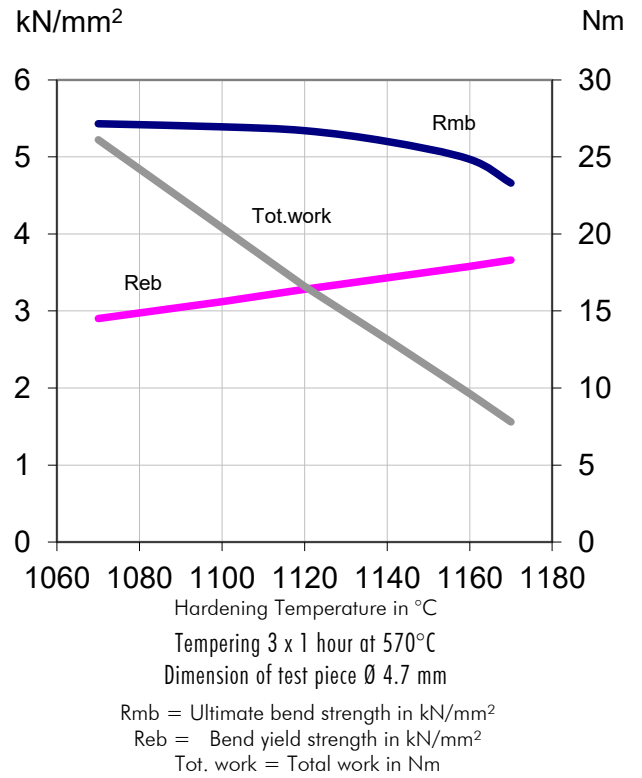
**PHYSICAL PROPERTIES**

	Temperature		
	20°C	400°C	600°C
Density g /cm <sup>3</sup>	7.9		
Modulus of elasticity kN/mm <sup>2</sup>	225	200	180
Thermal conductivity W/m°C	24	28	27
Specific heat J/kg °C	420	510	600

**IMPACT TOUGHNESS**



**4-POINT BEND STRENGTH**



**SAFETY DATA SHEET SDS: B**

**COMPARATIVE PROPERTIES**

