

## CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V
1.41	4.2	3.6	8.8	11.0	3.4

SAFETY DATA SHEET SDS: B

## STANDARDS

- Europe: HS 9-4-4-11
- Germany: 1.3208
- France: AFNOR Z140KWCDV10.9.4.4.3
- Sweden: SS2737

## DELIVERY HARDNESS

- Typical soft annealed hardness is 295 HB
- Cold drawn and cold rolled material is typically 10-40 HB harder

## DESCRIPTION

WKE 45 is a proprietary tungsten-molybdenum high speed steel. WKE 45 has greater hot hardness and more wear resistance than almost any other high speed steel together with medium but adequate toughness. WKE 45 is particularly suitable for working on very hard and abrasive materials.

## APPLICATIONS

- Tool bits
- Lathe tools
- Milling cutters
- Reamers
- Broaches
- Cold work tools
- Punches
- Cut off blades

## FORM SUPPLIED

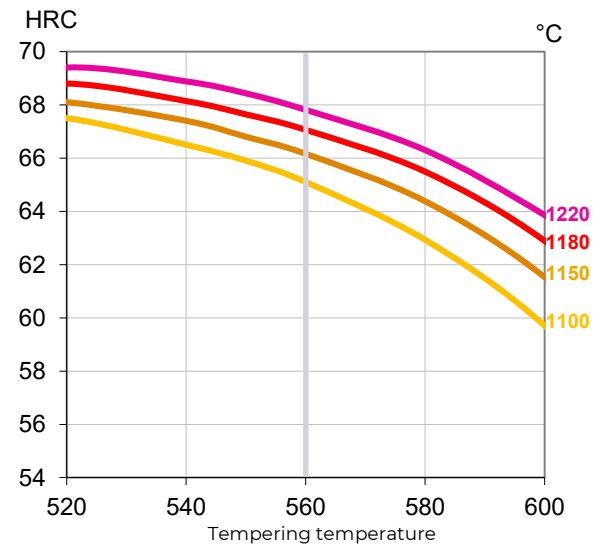
- Wire rod
- Round bars
- Flat bars
- Square bars
- Turned bars

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 preheating 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 3x1 hour

Tool	Hardening	Tempering
Single-edge cutting tools	1220°C	550-570°C
Multi-edge cutting tools	1200-1220°C	550-570°C
Cold work tools	1100-1180°C	550-570°C

## PROCESSING

WKE45 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

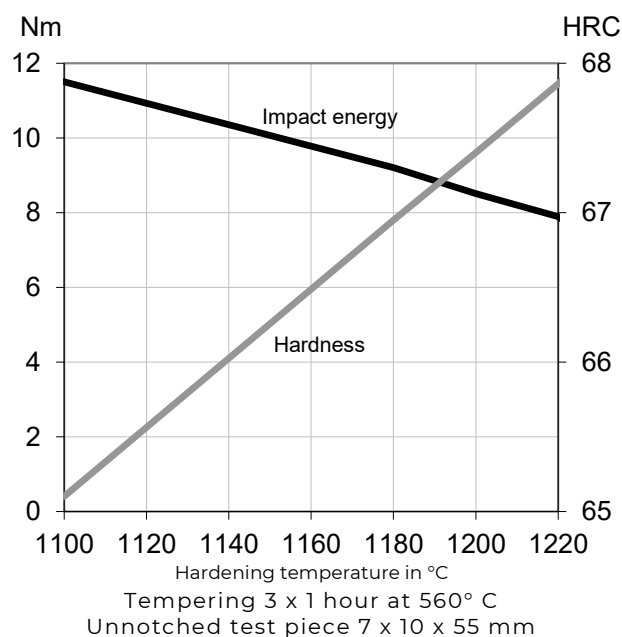
The steel grade is a perfect substrate material for PVD coating. If nitriding is requested, a small diffusion zone is recommended but avoid compound and oxidized layers.

**PROPERTIES**

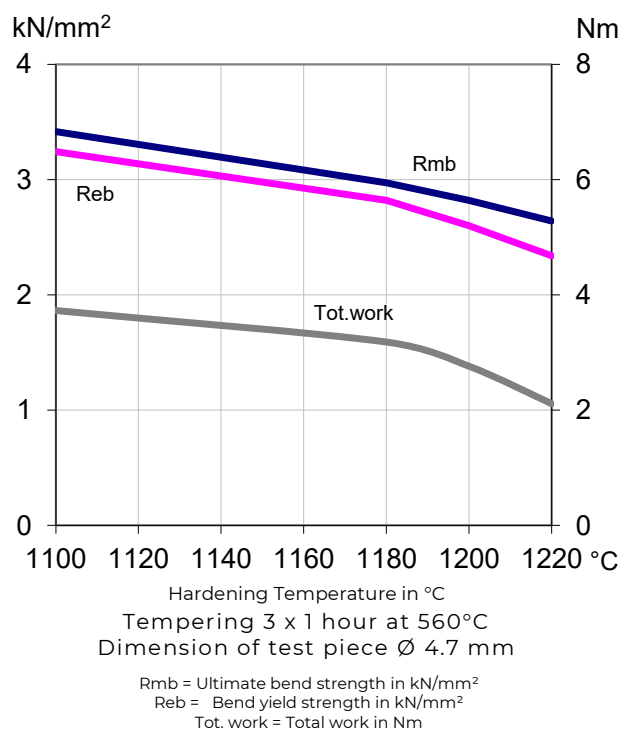
**PHYSICAL PROPERTIES**

Temperature	20°C	400°C	600°C
Density g/cm <sup>3</sup>	8.2	8.1	8.0
Modulus of elasticity kN/mm <sup>2</sup>	240	215	195
Thermal expansion ratio per °C	-	10.2x10 <sup>-6</sup>	10.0x10 <sup>-6</sup>
Thermal conductivity W/m°C	24	28	27
Specific heat J/kg °C	420	510	600

**IMPACT TOUGHNESS**



**4-POINT BEND STRENGTH**



**COMPARATIVE PROPERTIES**

