

## CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V
0.83	3.8	8.5	1.8	-	1.2

SAFETY DATA SHEET SDS: A

## STANDARDS

- USA: AISI M1
- Europe: HS 2-9-1
- Germany: 1.3346
- France: AFNOR Z85DCWV.8.4.2.1
- UK: BM1

## DELIVERY HARDNESS

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

## DESCRIPTION

EM1 is molybdenum-based grade which has a good machinability, a good performance and is used for many applications.

## APPLICATIONS

- Twist drills
- Taps
- Reamers
- Rolls
- Dies

## FORM SUPPLIED

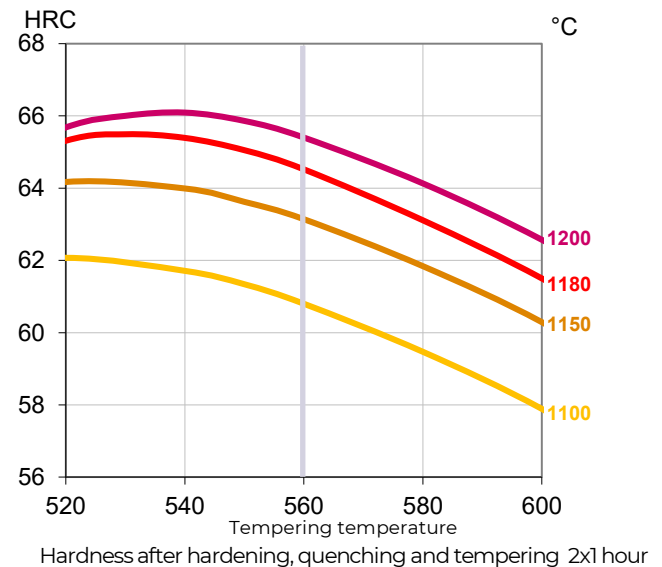
- Drawn wire
- Round bars
- Square bars
- Sheets
- Discs
- Flat bars

Available surface conditions: hot rolled, drawn, ground, 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.
- 2 tempers at 560°C are recommended with at least 1 hour holding time each time.

## GUIDELINES FOR HARDENING



Tool	Hardening	Tempering
Single-edge cutting tools	1200°C	560°C
Multi-edge cutting tools	1180-1200°C	550-570°C
Cold work tools	1100-1150°C	550-570°C

## PROCESSING

EM1 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

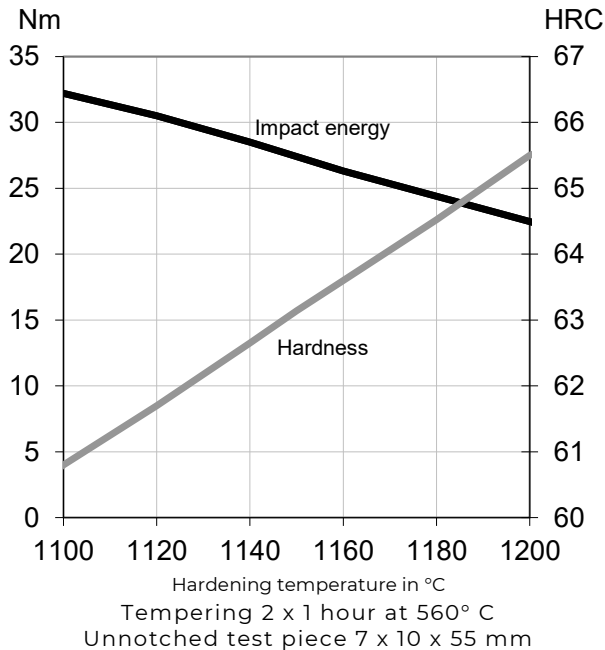
The steel grade is a perfect substrate material for PVD coating. If nitriding is requested, a small diffusion zone is recommended but avoid compound and oxidized layers.

**PROPERTIES**

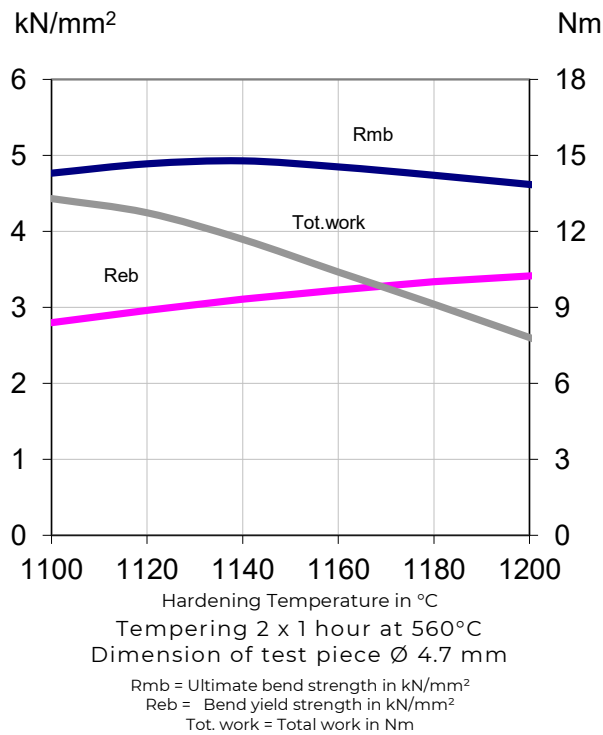
**PHYSICAL PROPERTIES**

Temperature	20°C
Density g /cm <sup>3</sup>	8.0

**IMPACT TOUGHNESS**



**4-POINT BEND STRENGTH**



**COMPARATIVE PROPERTIES**

