

## CHEMICAL COMPOSITION

| C    | Cr  | Mo  | W | Co | V   |
|------|-----|-----|---|----|-----|
| 0.84 | 4.0 | 4.2 | - | -  | 1.1 |

SAFETY DATA SHEET SDS: A

## STANDARDS

- USA: AISI M50
- Europe: HS 0-4-1
- Germany: 1.3325
- France: AFNOR Y80DCV.42.16

## DELIVERY HARDNESS

- Typical soft annealed hardness is 225 HB
- Cold drawn and cold rolled material is typically 10-40 HB harder

## DESCRIPTION

EM50 is a low alloyed high speed steel.

## APPLICATIONS

- Twist drills

## FORM SUPPLIED

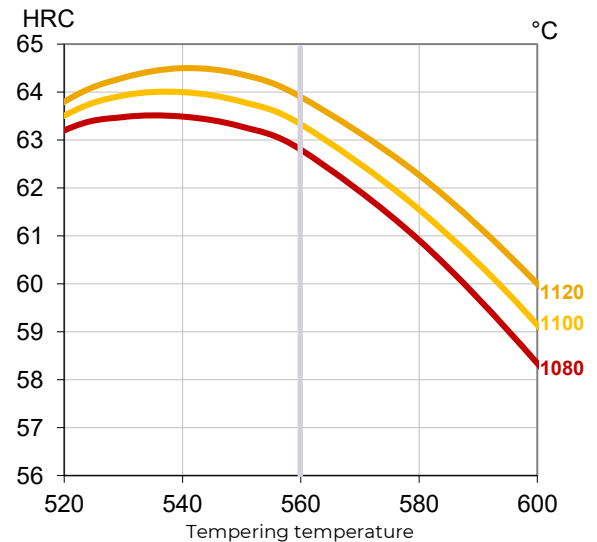
- Drawn wire
- Flat bars
- Round bars
- Square bars

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 pre-heating 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



Hardness after hardening, quenching and tempering 2x1 hour

| Tool                     | Hardening   | Tempering |
|--------------------------|-------------|-----------|
| Multi-edge cutting tools | 1100-1120°C | 550-570°C |
| Cold work tools          | 1080-1120°C | 550-570°C |

## PROCESSING

EM50 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

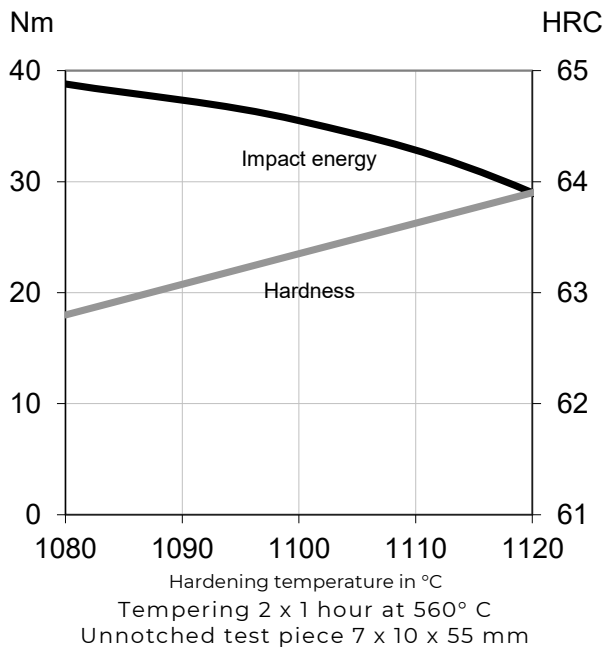
The steel grade is a perfect substrate material for PVD coating. If nitriding is requested, a small diffusion zone is recommended but avoid compound and oxidized layers.

**PROPERTIES**

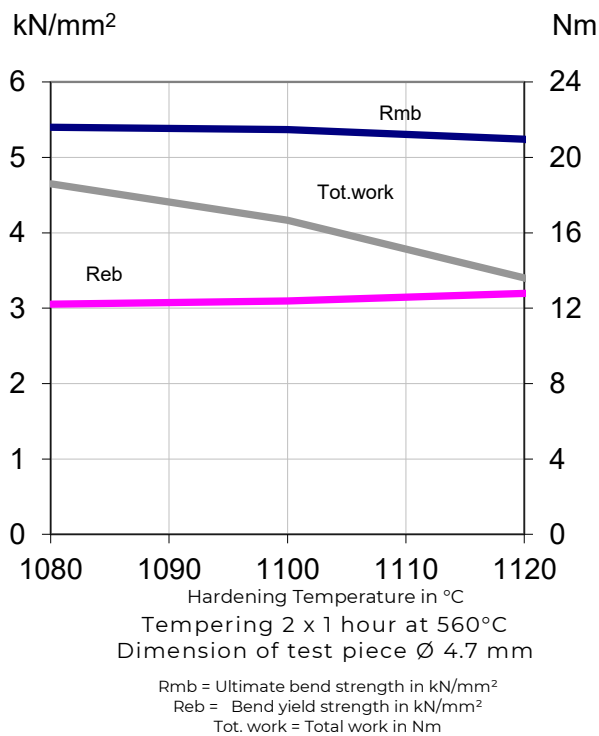
**PHYSICAL PROPERTIES**

| Temperature                | 20°C |
|----------------------------|------|
| Density g /cm <sup>3</sup> | 7.8  |

**IMPACT TOUGHNESS**



**4-POINT BEND STRENGTH**



**COMPARATIVE PROPERTIES**

