CONVENTIONAL GRADES

**M2** HIGH SPEED STEEL

CHEMICAL COMPOSITION

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| c | Cr | Mo | W | Co | V |
| 0.90\* | 4.2 | 5.0 | 6.4 | - | 1.8 |

\*0.85 for strips

STANDARDS

r~USA:AISI M2

* Europe: HS 6-5-2
* Germany: W.Nr. 1.3343
* France: (AFNOR Z85WDCV6.5.4.2)
* Sweden: SS 2722
* UK: BM2
* Japan: JIS SKH51

DELIVERY HARDNESS

Soft annealed max. 260 HB

Cold drawn max. 310 HB

Cold rolled max. 310 HB

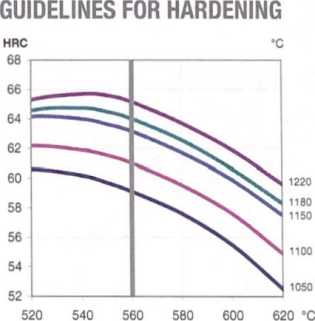
DESCRIPTION

E M2 is a medium-alloyed high speed steel which has a good machinability and a good performance and is used in a wide variety of applications.

APPLICATIONS

HEAT TREATMENT

* Soft annealing in a protective atmosphere at 850- 900°C for 3 hours, followed by slow cooling 1O°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 austenitizing at a temperature suitable for chosen working hardness.
* 2 tempers at 560°C are recommended with at least 1 hour holding time each time.



Tempering Temperature in °C

Hardness after hardening, quenching and tempering 2 x 1 hour

|  |  |
| --- | --- |
| ・ Twist drills | • Broaches |
| • Reamers | ・ Knives |
| • Milling cutters | • Saws |
| • Taps & dies | • Cold work tools |
| **FORM SUPPLIED** | |
| • Drawn wire | ・ Strips |
| • Wire rod | • Sheets |
| ♦ Round bars | • Discs |
| • Flat bars | • Bi-metal edges |

• Square bars

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

|  |  |  |
| --- | --- | --- |
| Tool | Hardening | Tempering |
| Single-edge cutting tools | 1220°C | 560°C |
| Multi-edge cutting tools | 1180-1220°C | 560°C |
| Cold work tools | 1100-1150°C | 560°C |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | AoDroximate Conversion | | | | | | | | | | | | | |
| °C | 20 | 25 | 400 | 450 | 500 | 520 | 540 | 560 | 600 | 620 | 700 | 800 | 850 | 900 |
| °F | 70 | 80 | 750 | 840 | 930 | 970 | 1000 | 1040 | 1110 | 1150 | 1290 | 1470 | □560 | | 1650~1 |

PROCESSING

E M2 can be worked as follows:

* machining (grinding, turning, milling)
* polishing
* plastic forming
* electrical discharge machining
* \*?lding (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 give some 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 pm is recommended. The steel grade can also be steam-tempered if so desired.

PROPERTIES

material safety data sheet

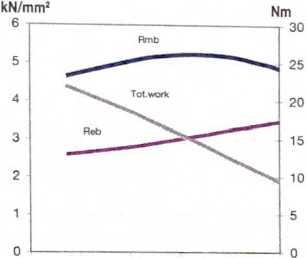
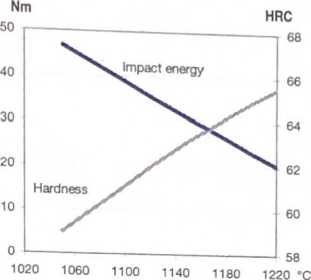
|  | Temperature | | |
| --- | --- | --- | --- |
| 20°C | 400。。 | 600°C | |
| Density g /cm3 (1) | 8.1 | 8.1 | 8.0 |
| Modulus of elasticity kN/mm2 (2) | 225 | 200 | 180 |
| Thermal expansion ratio per °C (2) | - | 12.1x1 O'6 | 12.6x10 |
| Thermal conductivity  W/m°C (2) | 24 | 28 | 27 |
| Specific heat J/kg °C (2) | 420 | 510 | 600 |

**PHYSICAL PROPERTIES**

⑴ Soft annealed

⑵ Hardened 1180°C and tempered 560°C, 3x 1 hour

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

MSDS:A

**IMPACT** strength

Hardening Temperature in °C

Tempering 2 x 1 hour at 560° C

Unnotched test piece 7x10x55 mm

**POINT BEND STRENGTH**

1020 1060 1100 1140 1180 1220 °C

Hardening Temperature in °C

Tempering 2 x 1 hour at 560° C

Unnotched test piece 04.7 mm