



## ASP 2023 HIGH SPEED STEEL

|                          |   |     |            |     |     |
|--------------------------|---|-----|------------|-----|-----|
| COMPOSITION<br>%         | C   | Cr  | Mo         | W   | V   |
|                          | 1.28  | 4.2 | 5.0        | 6.4 | 3.1 |
| STANDARDS                | (AISI M3:2; Werkstoff Nr 3344;<br>JIS SKH 53; S 6-5-3; AFNOR<br>2130 KWDCV 9.6.5.4.3; ISO S5)<br>SS-Stål 2725 |     |            |     |     |
| CONDITION AS<br>SUPPLIED | Soft Annealed   |     | Max 260 HB |     |     |
|                          | Drawn   |     | Max 300 HB |     |     |
|                          | Cold Rolled   |     | Max 320 HV |     |     |

ASP 2023 is a high-alloy high-speed steel, Manufactured powder metallurgically using the ASP Process. The steel is atomized, compacted and processed to the dimensions required. The result is an extremely homogeneous steel with a unique combination of properties. ASP 2023's homogeneous structure enhances such properties as dimensional stability and shape stability during heat treatment, as well as improving grindability and toughness. Toughness is good even for large dimensions. ASP 2023's method of manufacture and composition means that it can provide high hardness and good wear resistance.

## PHYSICAL PROPERTIES

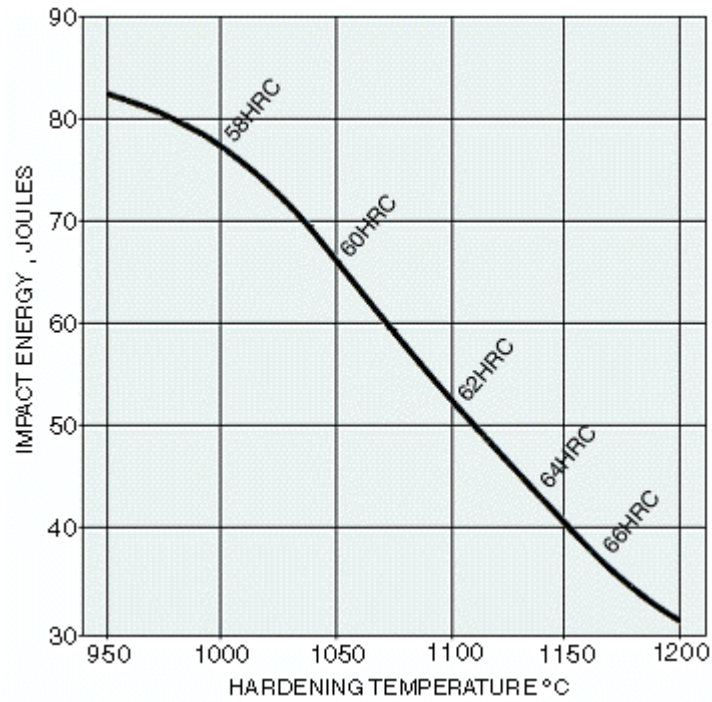
|                                       |                    |   | Temperature °C |                       |                       |
|---------------------------------------|--------------------|---|----------------|-----------------------|-----------------------|
|                                       |                    |   | 20             | 400                   | 600                   |
| DENSITY                               | Kg/m <sup>3</sup>  | 1 | 8050           | 7940                  | 7875                  |
| MODULUS OF ELASTICITY                 | kN/mm <sup>2</sup> | 2 | 230            | 205                   | 184                   |
| COEFFICIENT OF THERMAL EXPANSION FROM | 20°C, per °C       | 2 | -              | 12.1x10 <sup>-6</sup> | 12.7x10 <sup>-6</sup> |
| THERMAL CONDUCTIVITY                  | W/m °C             | 2 | 24             | 28                    | 27                    |
| SPECIFIC HEAT                         | J/kg °C            | 2 | 420            | 510                   | 600                   |

1 = Soft annealed

2 = Hardened 1180°C and tempered 560°C, 3x1 hour

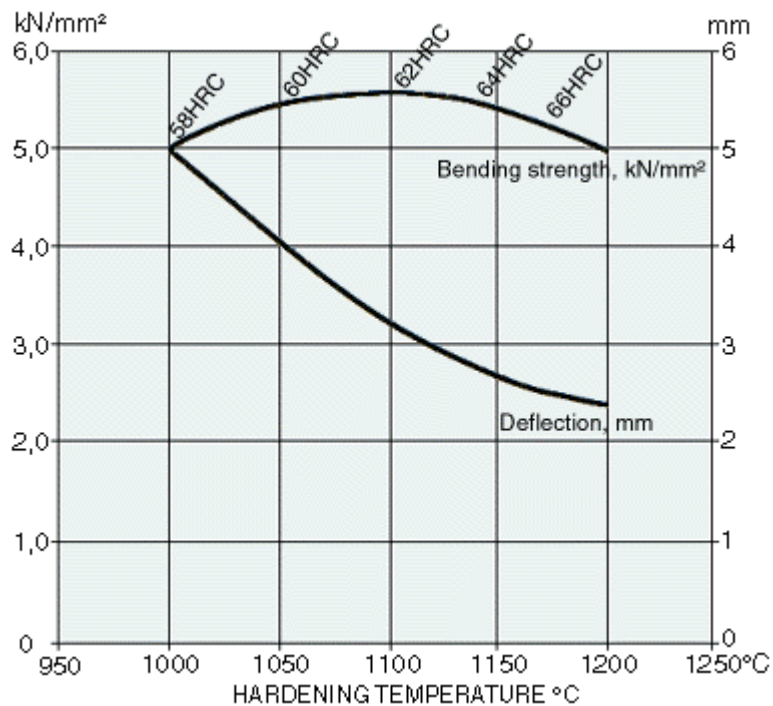
## IMPACT STRENGTH

Original dimensions 9 x 12 mm  
Tempering 3 x 1 hour at 560°C  
Unnotched test piece 7 x 10 x 55 mm



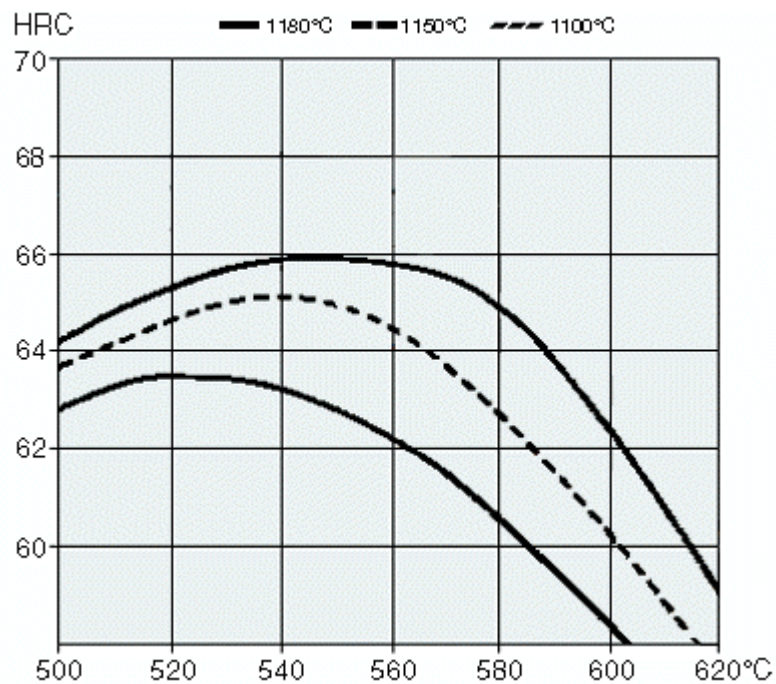
## 4 – POINT BENDING TEST

Original dimensions 6 mm Ø  
Tempering 560°C, 3 x 1 hour  
Dimensions of test piece 4.7 mm Ø



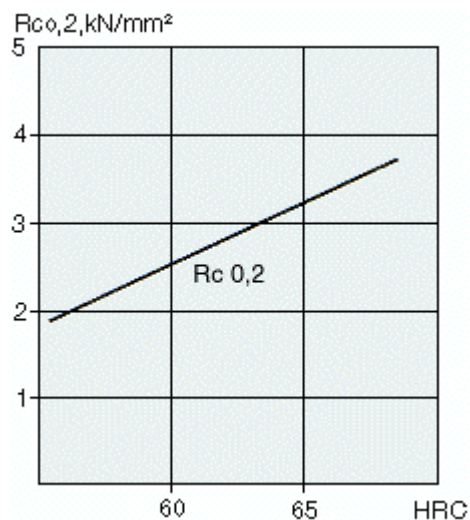
# HEAT TREATMENT

- Soft-annealing 850°C – 900°C, slow cooling 10°C/h to 700°C, hardness max 260 HB.
- Stress-relieving annealing 600°C – 700°C, approx. 2 hours at temperature, slow cooling to 500°C.
- Hardening according to table.  
Cooling to 40°C / 50°C.
- Tempering at 560°C 3 times for at least 1 hour each time. Cooling to room temperature (25°C) between temperings.

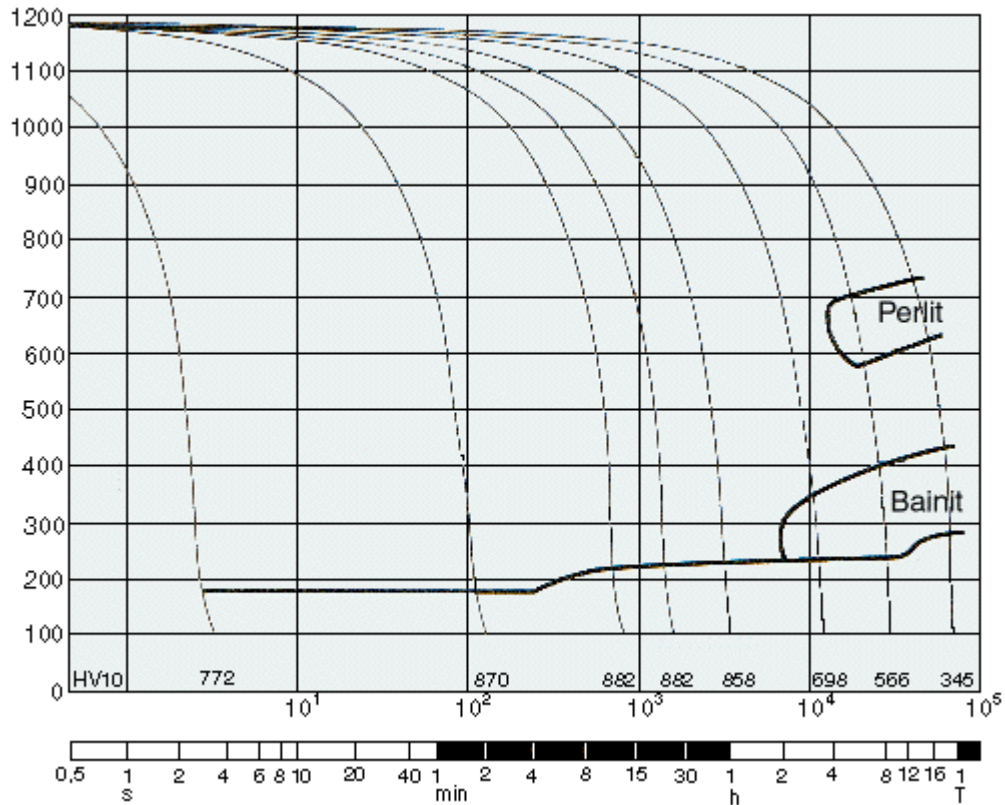


## COMPRESSION YIELD STRESS

Test piece: hour glass with 10 mm Ø waist



# CONTINUOUS COOLING TRANSFORMATION CURVE



## GUIDELINES FOR HARDENING

\* Tempering time 3x1 hour at 560 °C

| Hardness HRC * | Hardening Temp °C |
|----------------|-------------------|
| 56             | 975               |
| 58             | 1000              |
| 59             | 1030              |
| 60             | 1050              |
| 61             | 1075              |
| 62             | 1100              |
| 63             | 1120              |
| 64             | 1140              |
| 65             | 1160              |
| 66             | 1180              |

## MANUFACTURING PROGRAMME

| Form Supplied | Dimensional range mm |
|---------------|----------------------|
| Coils         | 1 - 22 Ø             |
| Round bars    | 1 - 385 Ø            |
| Square bars   | max 580 Ø            |
| Forged blanks | 1,5 x 7-50 x 380     |
| Flat bars     | 4,5 - 345            |
| Sections      |                      |
| Strip         |                      |
| Sheet         |                      |
| Discs         |                      |

Products are available drawn, centerless-ground, hot-worked, peeled, rough-machined, cold-rolled or hot-rolled depending on dimensions and requirements.

## SURFACE TREATMENT

ASP 2023 can be nitrided (a small diffusion zone of 2–20 µm, recommended) or steam-tempered if so desired. ASP 2023 is excellent as substrate material for PVD and CVD surface coating.