

NÍSTROJOVÉ OCELI PRO PRÁCI ZA TEPLA

Rozměrový sortiment k dispozici

Tyčová ocel

Popis produktu

BÖHLER W400 VMR - vakuově přetavená ocel pro práci za tepla s dobrou pevností za tepla a vynikající houževnatostí.

Trasa tavení

Airmelted + VAR

Vlastnosti

- > Houževnatost a tažnost : velmi vysoká
- > Odolnost proti opotřebení : dobré
- > Obrobitelnost : dobré
- > Tvrdost za tepla (červená tvrdost) : dobré
- > Leštitelnost : velmi vysoká
- > Tepelná vodivost : velmi vysoká
- > Mikročistota : velmi vysoká

Použití

- > Tlakové lití
- > Všeobecné díly pro strojírenství
- > Rychlokovací kování
- > Poloteplé lisování
- > Protlačování
- > Nízkotlaké lití
- > Strojírenství
- > Kování
- > Vstřikování plastů
- > Glasfibre reinforced plastics

Technické údaje

| Označení materiálu | | Normy | |
|--------------------|-------|-------|-------|
| 1.2340 | SEL | #207 | NADCA |
| ~T20811 | UNS | | |
| ~X37CrMoV5-1 | EN | | |
| ~H11 | AISI | | |
| E1810 | NADCA | | |

Chemické složení

| C | Si | Mn | Cr | Mo | V |
|------|------|------|------|------|------|
| 0,37 | 0,20 | 0,30 | 5,00 | 1,30 | 0,50 |

Materiálové vlastnosti

| | Síla za horka | Horká houevnatost | Odolnost proti opot?ebení za tepla |
|---|---------------|-------------------|------------------------------------|
|  | ★★ | ★★★★★ | ★★ |
|  | ★★ | ★★★★ | ★★ |
|  | ★★ | ★★★ | ★★ |
|  | ★★★ | ★★★★ | ★★★ |
|  | ★★★ | ★★★ | ★★★ |
|  | ★★★★ | ★★★ | ★★★★ |
|  | ★★★ | ★★★★★ | ★★★ |
|  | ★★★★★ | ★★★★ | ★★★★★ |
|  | ★★★ | ★★★★ | ★★★★ |

Stav dodání

Žiháno

| | |
|--------------|----------|
| Tvrlost (HB) | max. 205 |
|--------------|----------|

Tepelné zpracování

Annealing

| | | |
|---------|---------------|---|
| Teplota | 750 na 800 °C | Holding time 6 to 8 hours. Slow, controlled furnace cooling at 10 to 20°C/h (50 to 68 °F/hr) to approx. 600°C (1112°F), further cooling in air. |
|---------|---------------|---|

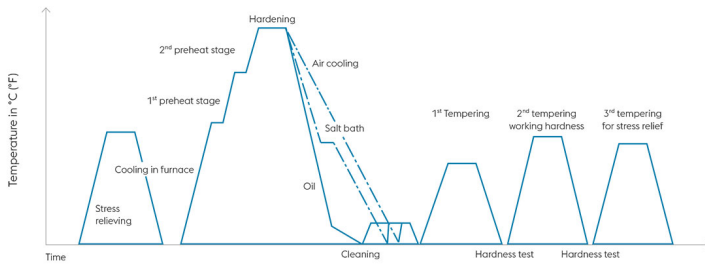
Žihání na odstranění vnitřního pnutí

| | | |
|---------|---------------|---|
| Teplota | 600 na 670 °C | For stress relief after extensive machining or for complicated tools. Holding time depending on tool size after complete heating 2 - 6 hours in neutral atmosphere. Slow furnace cooling. |
|---------|---------------|---|

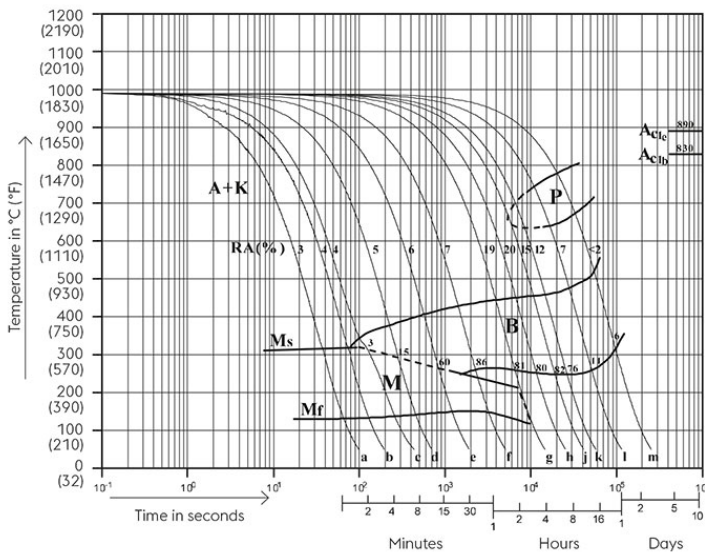
Kalení a popouštění

| | | |
|---------|---------------|--|
| Teplota | 980 na 990 °C | Holding time after temperature equalization: 15 to 30 minutes; In order to prevent coarsening of the grain, hardening must be carried out at the recommended temperature; Quenching: oil, salt bath (500 - 550°C [930 to 1020 °F]), air, inert gas in vacuum; After hardening, required tempering treatment to achieve desired working hardness (see tempering chart). |
|---------|---------------|--|

Heat treatment sequence



Continuous cooling CCT curves

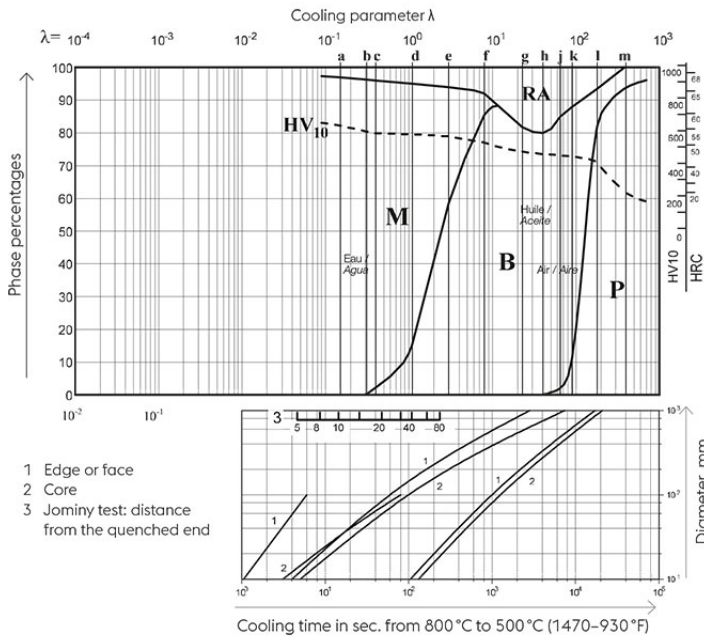


Austenitising temperature: 990°C (1814°F)
 Holding time: 15 minutes
 5...100 phase percentages
 0.15...400 cooling parameter, i.e. duration of cooling
 from 800 - 500°C (1472-932°F) in $s \times 10^{-2}$

Table:

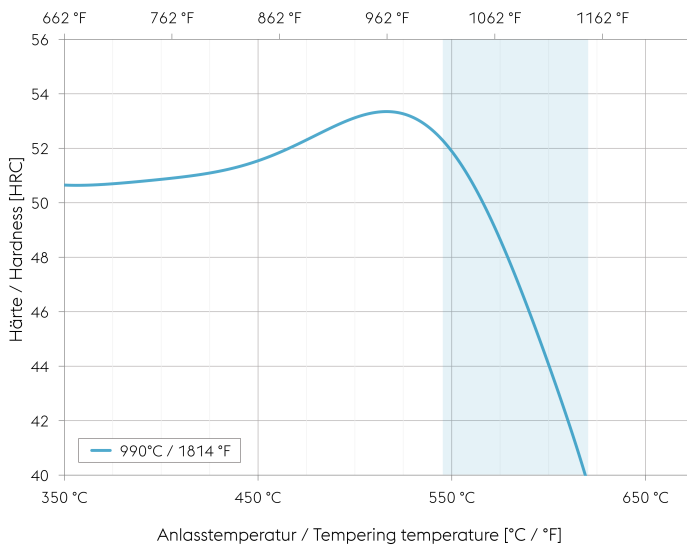
| Sample | λ | HV10 | Sample | λ | HV10 |
|--------|-----------|------|--------|-----------|------|
| a | 0,15 | 647 | g | 23 | 478 |
| b | 0,31 | 619 | h | 40 | 462 |
| c | 0,40 | 590 | j | 65 | 462 |
| d | 1,1 | 595 | k | 90 | 454 |
| e | 3 | 582 | l | 180 | 434 |
| f | 8 | 546 | m | 400 | 226 |

Quantitative phase diagram



A... Austenite
B... Bainite
K... Carbide
M... Martensite
P... Pearlite
RA... Retained austenite

Tempering chart



Tempering:

Slow heating to tempering temperature immediately after hardening (time in furnace 1 hour for each 0,787 inch (20 mm) of workpiece thickness but at least 2 hours / cooling in air).

It is recommended to temper at least twice.

A third tempering cycle for the purpose of stress relieving may be advantageous.

1st tempering approx. 86°F (30°C) above maximum secondary hardness.

2nd tempering to desired working hardness. The tempering chart shows average tempered hardness values.

3rd for stress relieving at a temperature 86 to 122°F (30 to 50°C) below highest tempering temperature.

Recommended tempering temperature range is indicated by the blue area in the chart.

Hardening temperature: 990°C (1814°F)
Specimen size: square 20 mm

Fyzikální vlastnosti

| | |
|--|------|
| Teplota (°C) | 20 |
| Hustota (kg/dm ³) | 7,8 |
| Tepelná vodivost (W/(m.K)) | 31,5 |
| Měrná tepelná kapacita (kJ/kg K) | 0,46 |
| Měrný elektrický odpor (Ohm.mm ² /m) | - |
| Modul pružnosti (10 ³ N/mm ²) | 211 |

Tepelná roztažnost

| Teplota (°C) | 100 | 200 | 300 | 400 | 500 | 600 |
|---|-----|------|------|------|-----|------|
| Tepelná roztažnost (10 ⁻⁶ m/(m.K)) | 11 | 11,2 | 11,9 | 12,7 | 14 | 14,3 |

For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

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