

# OCELE PRE PRÁCU ZA STUDENA

## Dostupné výrobné profily

 Tyčové polotovary\*

 Plechy

\* ) Presented data refer exclusively to long products. Please observe the detailed explanations at the end of the data sheet (pdf).

## Popis produktu

Strižné nástroje (matrice, razníky), nástroje pre lisovanie, rezanie závitov, nástroje na opracovanie dreva, strojné nože pre papierenský, drevársky a oceľarský priemysel, meradlá, formy na plasty.

## Spôsob výroby

 Konvenčná výroba

## Vlastnosti

Nástrojová oceľ kaliteľná v oleji, odolávajúca rozmerovým zmenám.

## Aplikácia

- > Tvárnenie za studena
- > Strižanie / Dierovanie / Lisovanie / Presné strižanie
- > Výroba normalizovaných dielov (strižníky, platne, kóliky, razníky)
- > Diely pre všeobecné strojárstvo

## Technické údaje

Označenie materiálu		Normy	
1.2842	SEL	4957	EN ISO
~T31502	UNS		
90MnCrV8	EN		
~O2	AISI		

## Chemické zloženie

C	Si	Mn	Cr	V
0,90	0,25	2,00	0,35	0,10

## Porovnanie vlastnosti materiálu

	Odolnosť proti tlakovému zaťaženiu	Rozmerová stabilita počas tepelného spracovania	Húževnatosť	Odolnosť proti abrazívnemu opotrebovaniu
<b>BÖHLER K720</b>	★★	★	★★★★★	★
<b>BÖHLER K245</b>	★★	★	★★★★★	★
<b>BÖHLER K455</b>	★★★	★	★★★★★	★
<b>BÖHLER K460</b>	★★★★★	★	★★★★★	★★

## Stav pri dodaní

### Žiháný

Tvrdosť (HB)	max. 229
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## Tepelné spracovanie

### Žihanie

Teplota	680 až 720 °C	Slow controlled cooling in furnace at a rate of 50 to 68°F/hr (10 to 20°C/hr) down to approx. 1112°F (600°C), further cooling in air.
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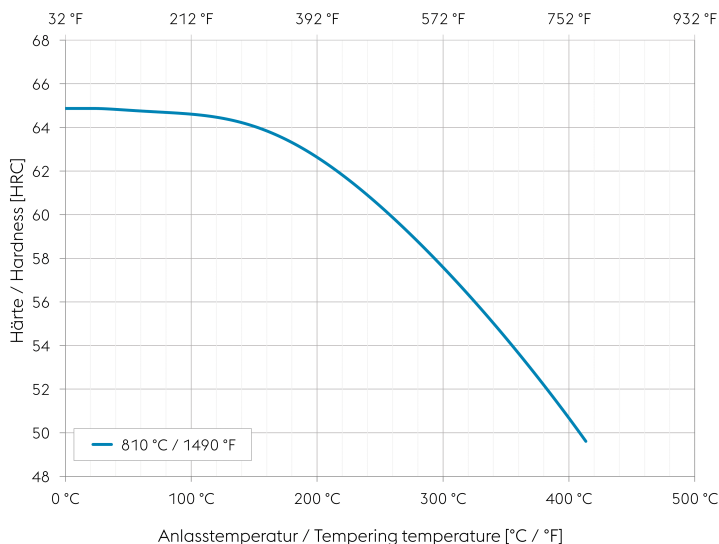
### Žihanie na odstránenie pnutí

Teplota	650 °C	Slow cooling in furnace Intended to relieve stresses set up by extensive machining, or in complex shapes. After through heating, hold in neutral atmosphere for 1-2 hours.
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### Kalenie a popúšťanie

Teplota	790 až 820 °C	Oil, salt bath 392 - 482°F (200 to 250°C) up to 0,787 inch (20 mm) thickness. Holding time after temperature equalization: 15 to 30 minutes. After hardening, tempering to the desired working hardness, see tempering chart.
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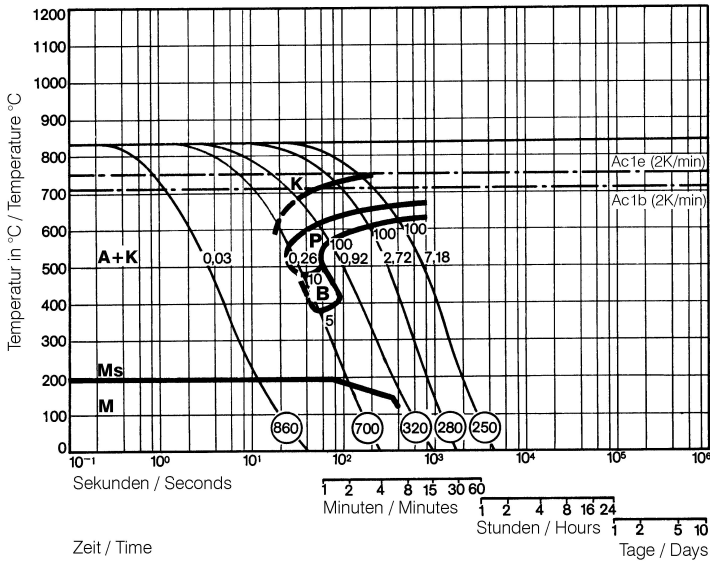
## Tempering chart



### Tempering:

Hardening temperature:  
 — 810°C / 1490°F  
 Specimen size: square 20 mm

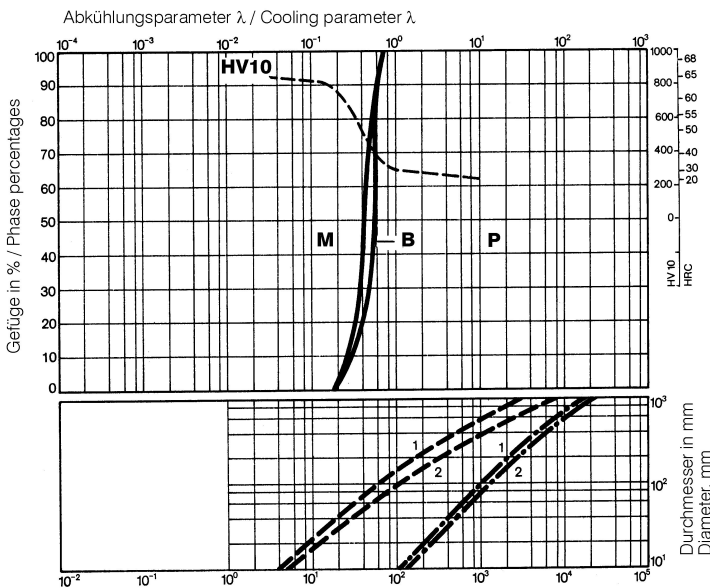
Continuous cooling CCT curves



Austenitising temperature: 1508°F (820°C)  
Holding time: 15 minutes

O Vickers hardness  
5...100 phase percentages  
0.03...7.18 cooling parameter, i.e. duration of cooling from 1472 to 932°F (800 to 500°C) in  $s \times 10^{-2}$   
35,6°F/min (2 K/min)... cooling rate in °F/min (K/min) in the 1472 to 932°F (800 to 500°C) range

Quantitative phase diagram



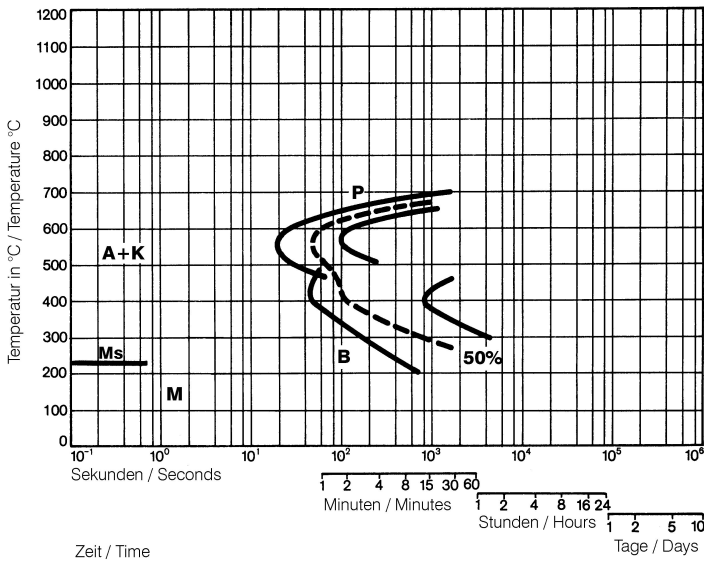
A... Austenite  
B... Bainite  
K... Carbide  
M... Martensite  
P... Perlite

----- Oil cooling  
- · - Air cooling

1... Edge or face  
2... Core

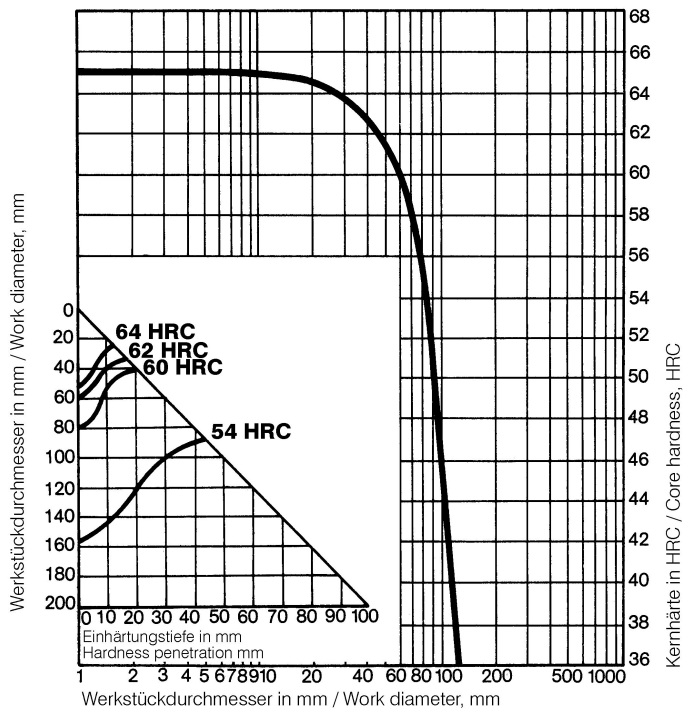
Kühlzeit von 800°C auf 500°C in Sek. / Time of cooling from 800°C to 500°C in sec.

**Isothermal TTT curves**



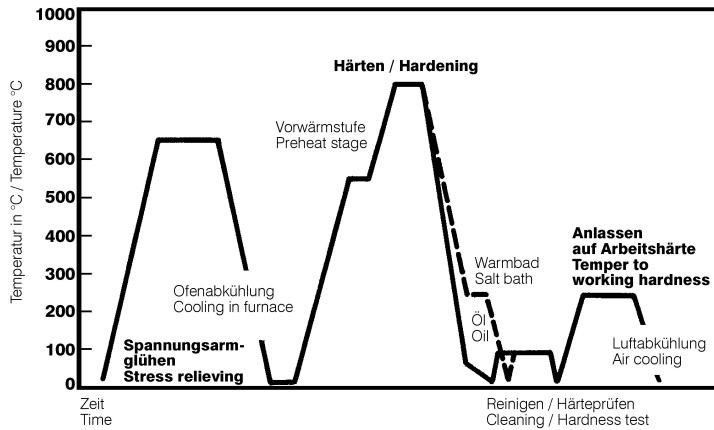
Austenitising temperature: 820°C / 1508°F  
Holding time: 15 minutes

**Influence of work diameter on core hardness and hardness penetration**



Quenched from: 820°C / 1508°F  
Agent: Oil

## Heat treatment sequence



## Fyzikálne vlastnosti

Teplota (°C)	20
Hustota (kg/dm <sup>3</sup> )	7,85
Tepelná vodivosť (W/(m.K))	30
Merná tepelná kapacita (kJ/kg K)	0,46
Merný elektrický odpor (Ohm.mm <sup>2</sup> /m)	0,35
Modul pružnosti (10 <sup>3</sup> N/mm <sup>2</sup> )	210

## Tepelná roztažnost

Teplota (°C)	100	200	300	400	500
Tepelná roztažnost ( $10^{-6}$ m/(m.K))	11,5	12	12,2	12,5	12,8

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

**Sheet & Plates:** Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact voestalpine BÖHLER Bleche GmbH & Co KG.

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