

# 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

Vysoko namáhané masívne raziace nástroje, nástroje na lisovanie príborov, nástroje na vtláčanie za studena, nože nožníc na strihanie za studena pre väčšie hrúbky, formy pre lisovanie plastov.

## Spôsob výroby

 Konvenčná výroba

## Vlastnosti

- > Húževnatosť a odolnosť proti plastickej deformácii : vysoká
- > Rozmerová stabilita : dobré

## Aplikácia

- > Strojové nože (pre výrobcov)
- > Stríhanie / Dierovanie / Lisovanie / Presné strihanie
- > Komponenty pre recykláciu
- > Tvárnenie za studena
- > Výroba normalizovaných dielov (strižníky, platne, kolíky, razníky)
- > Razenie
- > Diely pre všeobecné strojárstvo

## Technické údaje

Označenie materiálu	
~1.2721	SEL
~50NiCr13	EN

## Chemické zloženie

C	Si	Mn	Cr	Mo	Ni
0,55	0,30	0,40	1,00	0,25	3,00

**Porovnanie vlastnosti materiálu**

	Odolnosť proti tlakovému zaťaženiu	Rozmerová stabilita počas tepelného spracovania	Húževnatosť	Odolnosť proti abrazívnemu opotrebovaniu
<b>BÖHLER K605</b>	★★	★★★	★★★★★	★
<b>BÖHLER K305</b>	★★★★★	★★★	★★	★★★★★
<b>BÖHLER K306</b>	★★★★★	★★★	★★★★★	★★★
<b>BÖHLER K313</b>	★★★★★	★★★	★★★	★★★
<b>BÖHLER K320</b>	★★★	★★★	★★★	★★★
<b>BÖHLER K329</b>	★★★	★★★	★★★★★	★★★★★
<b>BÖHLER K600</b>	★	★★★	★★★★★	★
<b>BÖHLER K601</b>	★	★★★	★★★★★	★★

**Stav pri dodaní**
**Žiháný**

Tvrdosť (HB)	max. 250
--------------	----------

**Tepelné spracovanie**
**Žihanie**

Teplota	610 až 650 °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.
---------	---------------	---------------------------------------------------------------------------------------------------------------------------------------

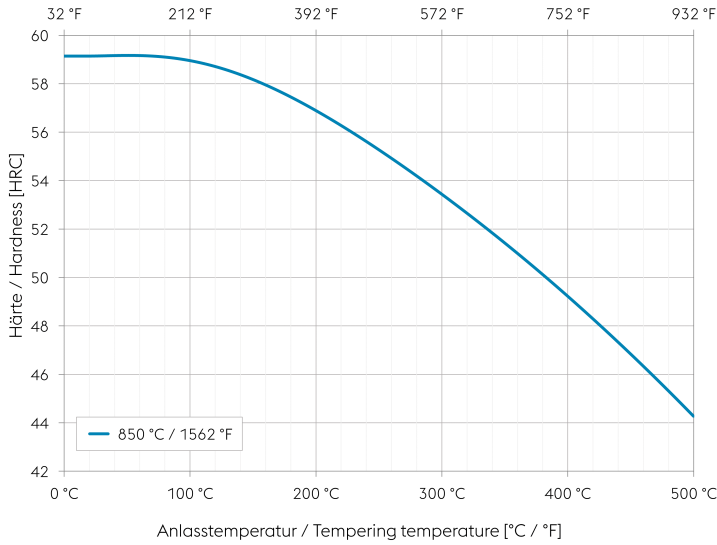
**Žihanie na odstránenie pnutí**

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.
---------	--------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**Kalenie a popúšťanie**

Teplota	840 až 870 °C	Air, Oil Holding time after temperature equalization: 15 to 30 minutes. After hardening, tempering to the desired working hardness, see tempering chart.
---------	---------------	----------------------------------------------------------------------------------------------------------------------------------------------------------

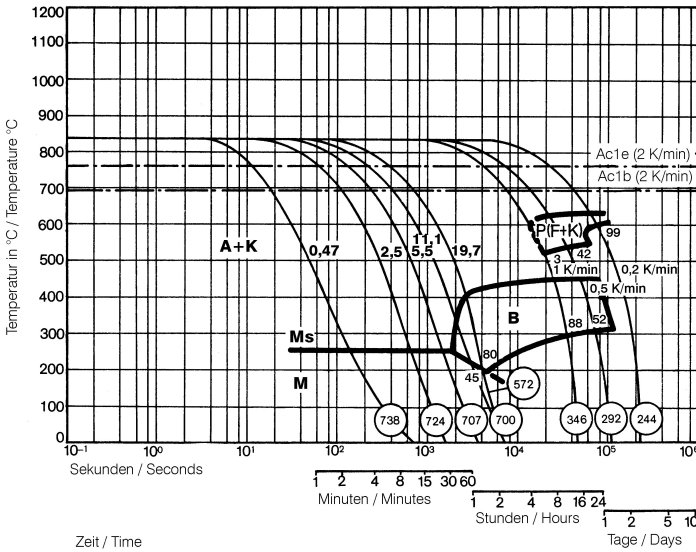
**Tempering chart**



**Tempering:**

Hardening temperature: 850°C  
 Specimen size: square 20 mm

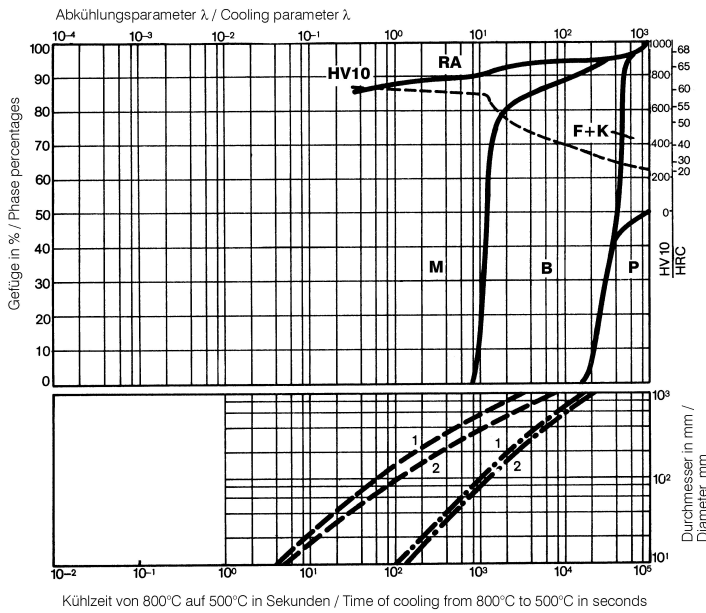
**Continuous cooling CCT curves**



Austenitising temperature: 1544°F (840°C)  
 Holding time: 20 minutes

O Vickers hardness  
 3...99 phase percentages  
 0.47...19.7 cooling parameter, i.e. duration of cooling from 1472 to 932°F (800 to 500°C) in  $s \times 10^{-2}$   
 33,8...32,36°F/min (1...0.2K/min) cooling rate in °F/min (K/min) in the 1472 to 932°F (800 to 500°C) range.

**Quantitative phase diagram**

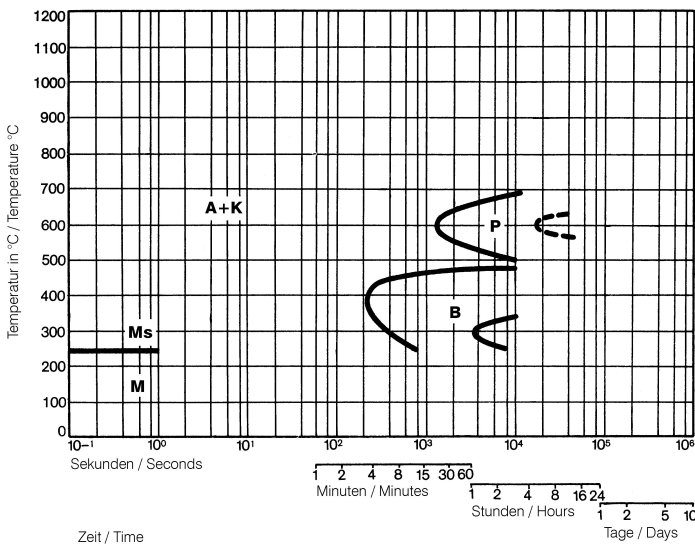


- A... Austenite
- B... Bainite
- F... Ferrite
- K... Carbide
- M... Martensite
- P... Pearlite
- RA... Retained austenite

- - - Oil cooling
- · - Air cooling

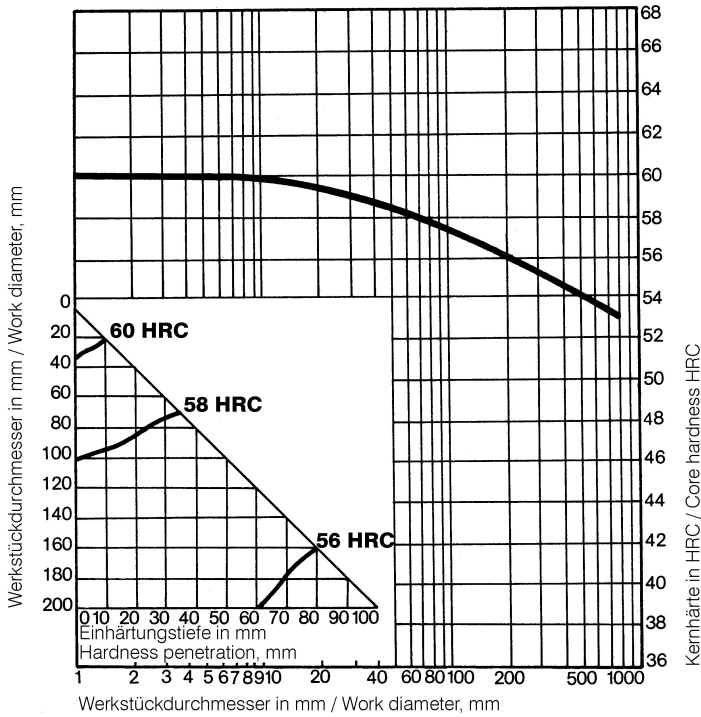
- 1... Edge or face
- 2... Core

**Isothermal TTT curves**



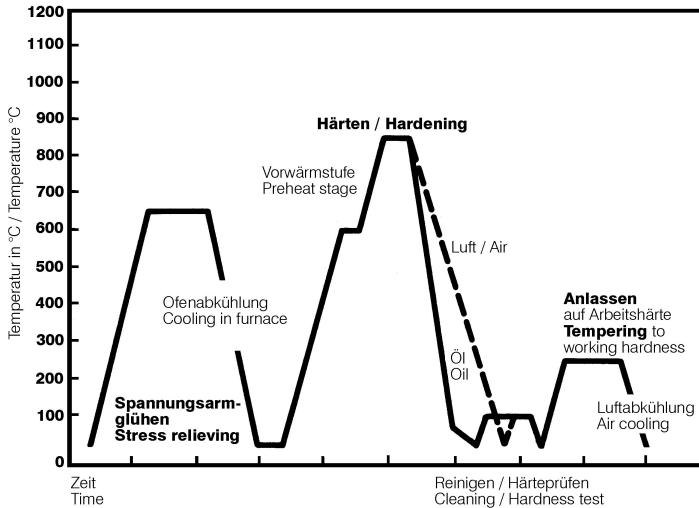
Austenitising temperature: 840°C / 1544°F  
 Holding time: 20 minutes

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



Quenched from: 850°C / 1562°F  
Agent: Oil

**Heat treatment sequence**



## Fyzikálne vlastnosti

Teplota (°C)	20
Hustota (kg/dm <sup>3</sup> )	7,85
Tepelná vodivosť (W/(m.K))	28
Merná tepelná kapacita (kJ/kg K)	0,46
Merný elektrický odpor (Ohm.mm <sup>2</sup> /m)	0,3
Modul pružnosti (10 <sup>3</sup> N/mm <sup>2</sup> )	210

## Tepelná rozťažnosť

Teplota (°C)	100	200	300	400	500
Tepelná rozťažnosť (10 <sup>-6</sup> m/(m.K))	11	12,5	13	13,5	14

**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.

*The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. Measurement data are laboratory values and can deviate from practical analyses. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.*