

# ČELICI ZA HLADNI RAD

## Dostupne varijante proizvoda

 Šipkasti proizvodi\*

 Ploče

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

## Opis proizvoda

Rezni alati (matrice i probojci), alati za prosijecanje i probijanje, alati za izradu navoja, alati za obradu drveta, strojni noževi za drvo, papirnu i metalnu industriju, mjerni alati i uređaji, kalupi za industriju plastike.

## Put taljenja

 Airmelted

## Karakteristike

- > Žilavost i duktilnost : visok
- > Otpornost na habanje : dobar
- > Tlačna čvrstoća : vrlo visoka
- > Dimenzionalna stabilnost : dobar
- > Mogućnost brušenja : visok

## Korištenje

- > Cold Forming
- > Precizno štancanje / štancanje / pečačenje
- > Standardni dijelovi (kalupi, ploče, klinovi, probijači)

## Technički podaci

Oznaka materijala		Standardi	
1.2510	SEL	4957	EN ISO
T31501	UNS	A681	ASTM
100MnCrW4	EN		
O1	AISI		
~SKS3	JIS		

## Kemijski sastav

C	Si	Mn	Cr	V	W
0,95	0,25	1,10	0,55	0,10	0,55

## Materijal

	Kapacitet tlaka	Dimenzionalna stabilnost u toplinskoj obradi	Žilavost	Abraziv otpora na habanje
<b>BÖHLER K460</b>	★★★★	★	★★★★	★★
<b>BÖHLER K245</b>	★★	★	★★★★★	★
<b>BÖHLER K455</b>	★★★	★	★★★★★	★
<b>BÖHLER K720</b>	★★	★	★★★★	★

## Isporuka

### Annealed

Tvrdoća (HB)	max. 220
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## Toplinska obrada

### Annealing

Temperatura	710 do 750 °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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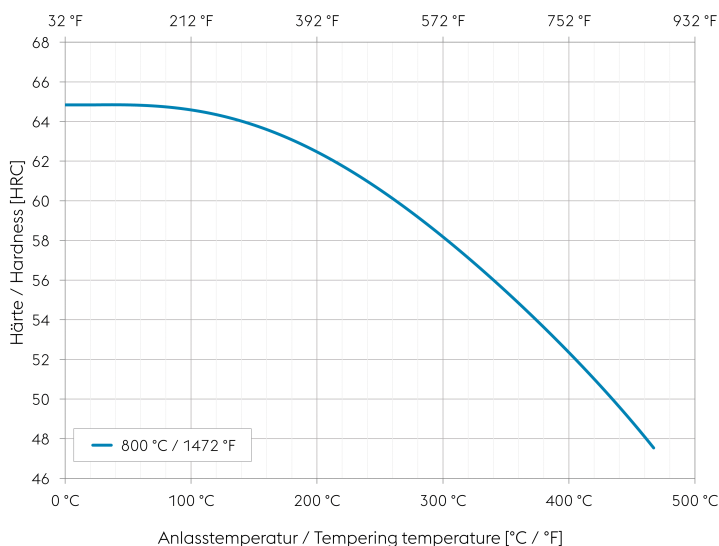
### Stress relieving

Temperatura	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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### Hardening and Tempering

Temperatura	780 do 820 °C	Oil. Salt bath 392 to 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



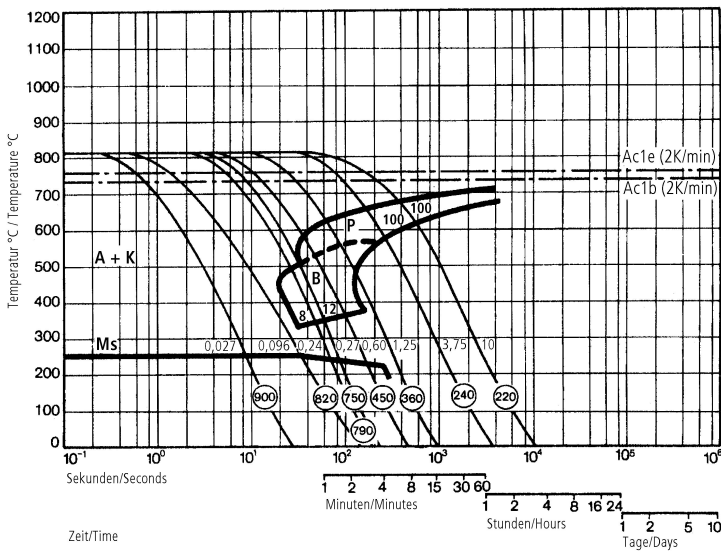
### Tempering:

Hardening temperature:

800°C

Specimen size: square 20 mm

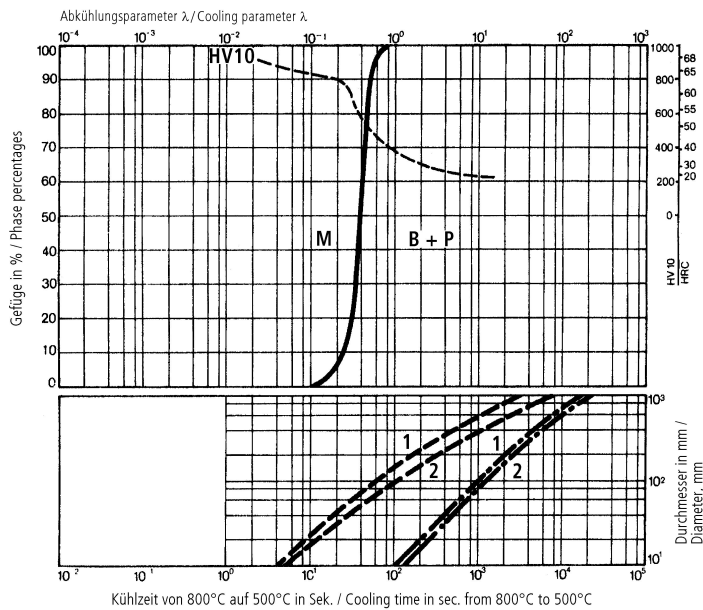
Continuous cooling CCT curves



Austenitising temperature: 1490°F (810°C)  
Holding time: 15 minutes

O Vickers hardness  
8...100 phase percentages  
0.027...10 cooling parameter (λ), i.e. duration of cooling from 1472 to 932°F (800 to 500°C) in  $s \times 10^{-2}$

Quantitative phase diagram

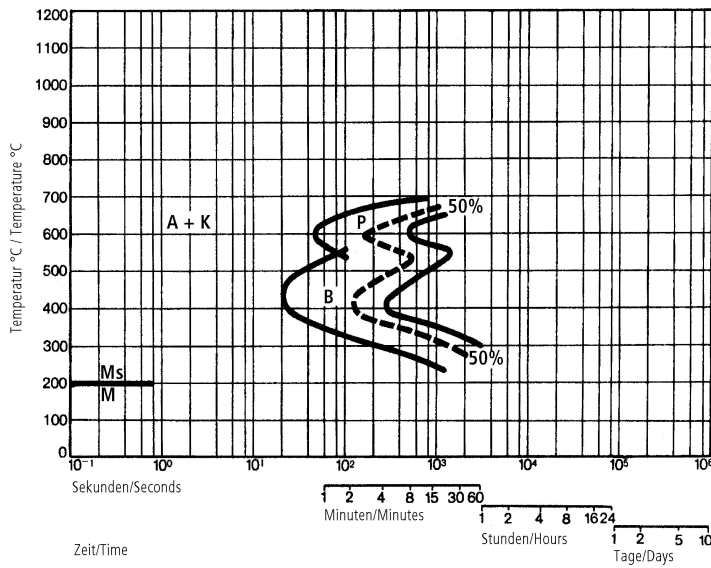


A... Austenite  
B... Bainite  
K... Carbide  
M... Martensite  
P... Pearlite

----- Oil cooling  
- · - Air cooling

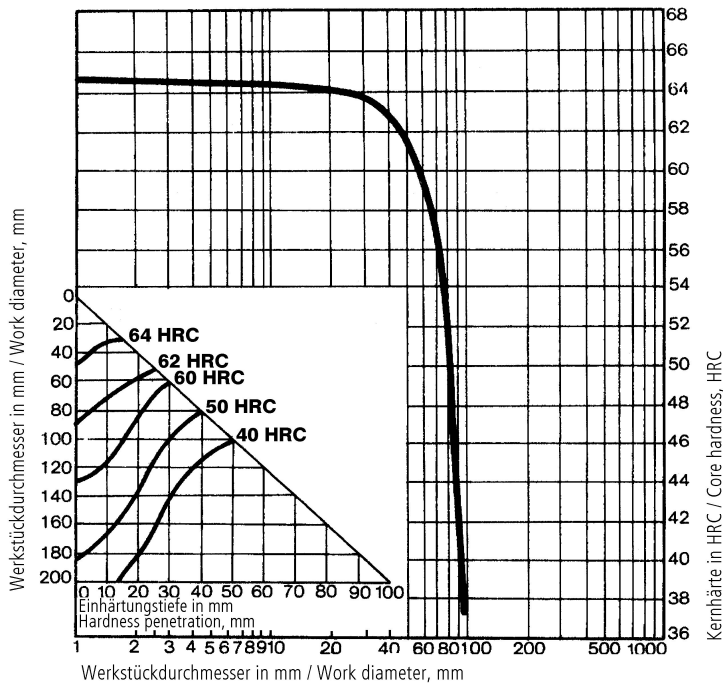
1... Edge or face  
2... Core

**Isothermal TTT curves**



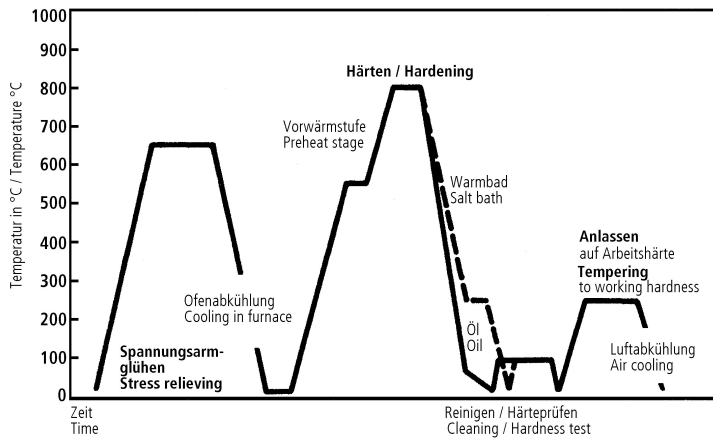
Austenitising temperature: 810°C / 1490°F  
Holding time: 15 minutes

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



Quenched from: 800°C / 1472°F  
Agent: Oil

## Heat treatment sequence



## Fizička svojstva

Temperatura (°C)	20
Gustoća (kg/dm <sup>3</sup> )	7,85
Toplinska vodljivost (W/(m.K))	30
Specifični toplinski kapacitet (kJ/kg K)	0,46
Spec. Otpornik (Ohm.mm <sup>2</sup> /m)	0,35
Modul elastičnosti (10 <sup>3</sup> N/mm <sup>2</sup> )	210

## Toplinska ekspanzija

Temperatura (°C)	100	200	300	400	500
Toplinska ekspanzija (10 <sup>-6</sup> 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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