

# SOĞUK İŞ ÇELİKLERİ

## Mevcut Ürün Şekilleri

Uzun Ürünler\*

Levhalar

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

## Ürün Tanımı

BÖHLER K460 corresponds to the material 1.2510 (100MnCrW4, O1) and has comparable properties to the popular tool steel 1.2842. Additional alloying with tungsten achieves higher resistance to abrasive wear compared to the tool steel 1.2842. BÖHLER K460 offers the advantage of simple heat treatment with low hardening temperatures and single tempering. However, this characteristic tempering behaviour limits the use of advanced coatings. The material has a good hardening response, but only moderate through hardenability. BÖHLER K460 is used for punching and cutting tools, plastic molds, thread cutting tools and machine knives in the wood, paper and recycling industries.

## Erime rotası

Airmelted

## Özellikler

- > Tokluk ve Süneklik : yüksek
- > Aşınma Direnci : iyi
- > Basınç Dayanımı : çok yüksek
- > Boyutsal kararlılık : iyi
- > Öğütülebilirlik : yüksek

## Uygulamalar

- > Cold Forming
- > Fine Blanking, Stamping, Blanking
- > Standard Parts (Molds, Plates, Pins, Punches)

## Teknik veriler

Malzeme Tanımı		Standartlar	
1.2510	SEL	4957	EN ISO
T31501	UNS	A681	ASTM
100MnCrW4	EN		
O1	AISI		
~SKS3	JIS		

## Kimyasal Bileşim

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

## Malzeme özellikleri

	Basınç Dayanımı	Isıl işlem sırasında boyutsal kararlılık	Sertlik	Aşındırıcı aşınma direnci
BÖHLER K460	★★★★	★	★★★★★	★★
BÖHLER K245	★★	★	★★★★★	★
BÖHLER K455	★★★	★	★★★★★	★
BÖHLER K720	★★	★	★★★★★	★

## Teslimat durumu

### Annealed

Sertlik (HB)	maks. 220
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## Isıl işlem

### Annealing

Sıcaklık	710 kadar 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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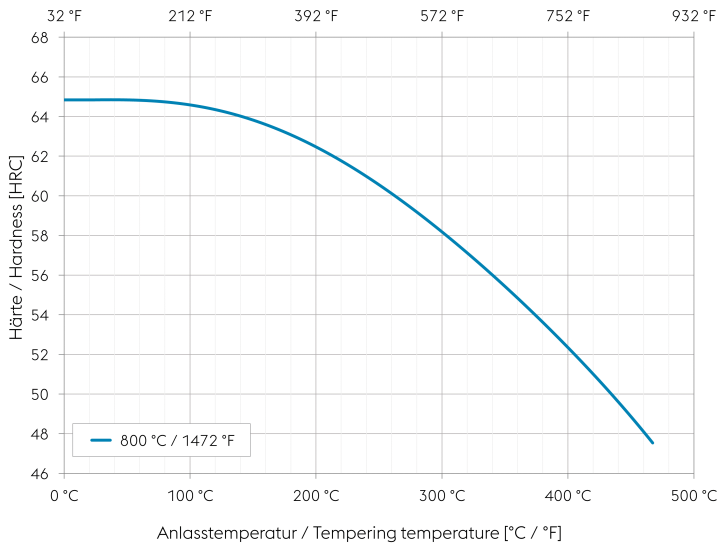
### Stress relieving

Sıcaklık	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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### Sertleştirme ve Temperleme

Sıcaklık	780 kadar 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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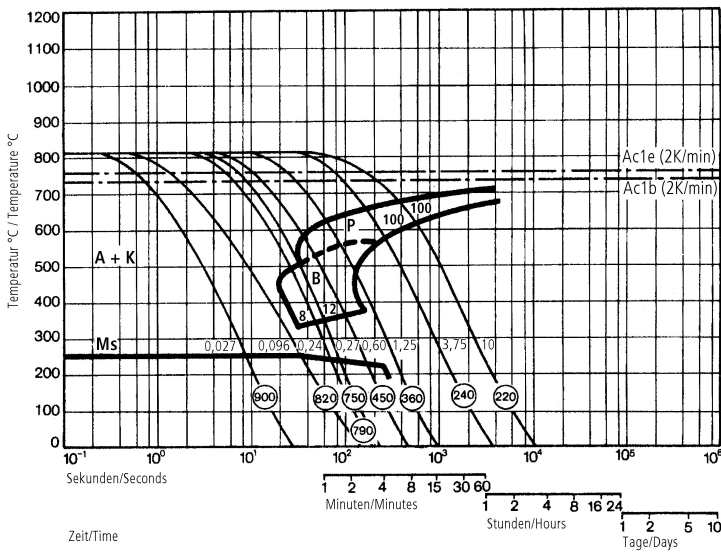
## Tempering chart



### Tempering:

Hardening temperature:  
 800°C  
 Specimen size: square 20 mm

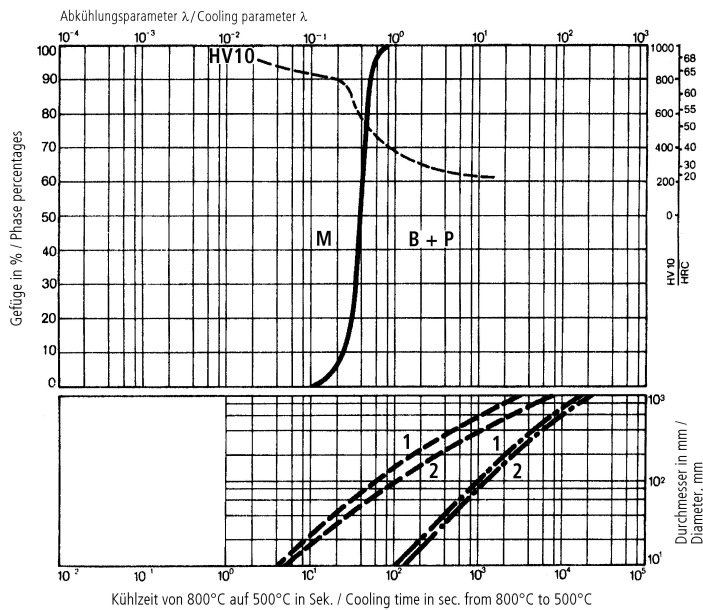
Continuous cooling CCT curves



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 x 10<sup>-2</sup>

Quantitative phase diagram

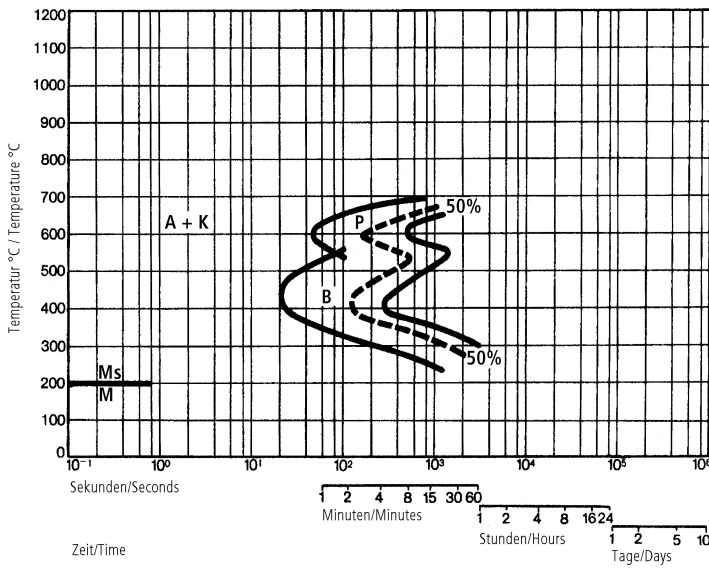


A... Austenite  
B... Bainite  
K... Carbide  
M... Martensite  
P... Pearlite

----- Oil cooling  
- · - Air cooling

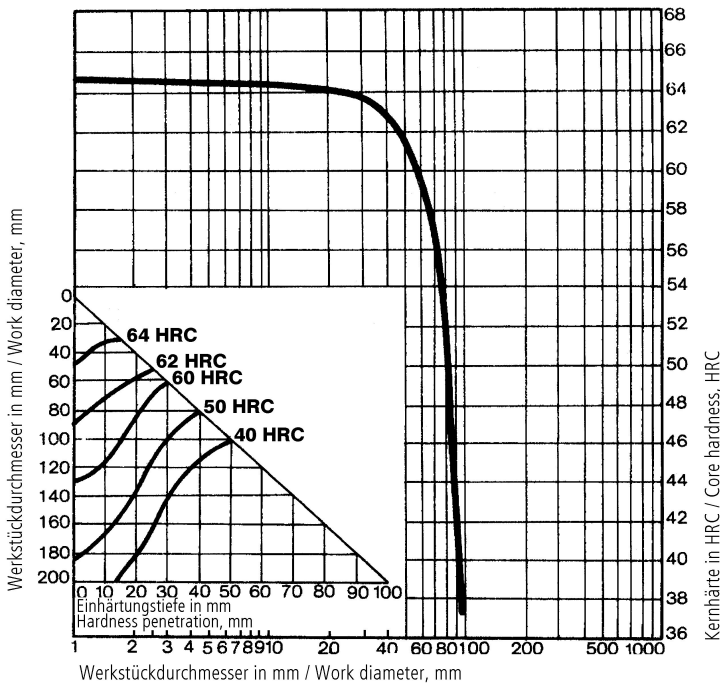
1... Edge or face  
2... Core

**Isothermal TTT curves**



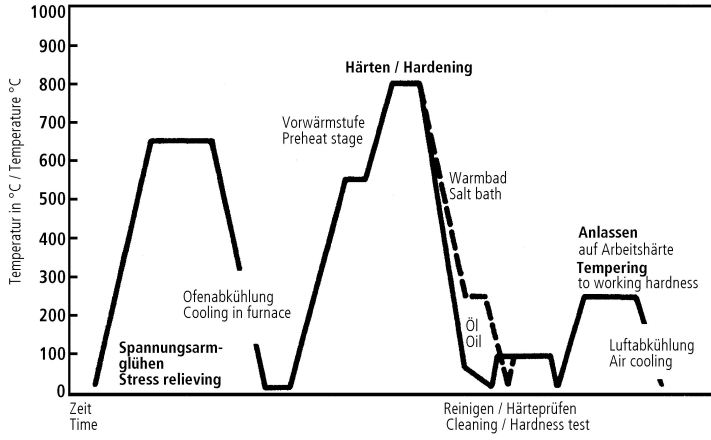
Austenitising temperature: 810°C / 1490°F  
Holding time: 15 minutes

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



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

## Heat treatment sequence



## Fiziksel özellikler

Sıcaklık (°C)	20
Yoğunluk (kg/dm <sup>3</sup> )	7,85
Termal iletkenlik (W/(m.K))	30
Özgül ısı kapasitesi (kJ/kg K)	0,46
Spes. elektrik direnci (Ohm.mm <sup>2</sup> /m)	0,35
Elastikiyet modülü (10 <sup>3</sup> N/mm <sup>2</sup> )	210

## Termal genişlemeler

Sıcaklık (°C)	100	200	300	400	500
Termal genişleme (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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