

SOĞUK İŞ ÇELIKLERI

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 K110 is a 12% ledeburitic chromium steel and corresponds to material number 1.2379 (X153CrMoV12, D2). This tool steel combines the advantages of conventional 12% ledeburitic chromium steels with those of advanced tool steels. In the group of 12% ledeburitic chromium steels, BÖHLER K110 offers the best combination of wear resistance, compressive strength and toughness, for which reason it is used in virtually all cold work applications. Its advantageous tempering behavior with a pronounced secondary hardness maximum also enables the use of advanced coatings. This also makes BÖHLER K110 suitable for complex tools requiring a high degree of dimensional stability and shape stability.

Erime rotası

Airmelted

Özellikler

- > Aşınma Direnci : iyi
- > Boyutsal kararlılık : iyi
- > Düşük boyutsal değişime sahip ikincil sertleştirme soğuk iş çeliği : iyi

Uygulamalar

- > Machine knife (for producers)
- > Coining
- > Standard Parts (Molds, Plates, Pins, Punches)
- > Comps. for Equip. Below Ground (Boring, Shafts, etc.)
- > Makine Mühendisliği için Genel Parçalar
- > Rolling
- > Fine Blanking, Stamping, Blanking
- > Screws and Barrels
- > Haddeler
- > Thread rolling (TR)
- > Cold Forming
- > Powder Pressing
- > Geri Dönüşüm Endüstrisi için Parçalar
- > Wear parts

Teknik veriler

Malzeme Tanımı		Standartlar	
1.2379	SEL	4957	EN ISO
~T30402	UNS		
X153CrMoV12	EN		
D2	AISI		

Kimyasal Bileşim

C	Si	Mn	Cr	Mo	V
1,55	0,30	0,30	11,30	0,75	0,75

Malzeme özellikleri

	Basınç Dayanımı	Isıl işlem sırasında boyutsal kararlılık	Sertlik	Aşındırıcı aşınma direnci	Aşınma direnci yapıştırıcı
BÖHLER K110	★★	★★★	★	★★★	★★
BÖHLER K100	★★	★★	★	★★★	★★
BÖHLER K105	★★	★★	★	★★	★★
BÖHLER K107	★★	★★	★	★★★	★★
BÖHLER K190 MICROCLEAN®	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BÖHLER K294 MICROCLEAN®	★★★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K340 ECOSTAR®	★★★	★★★	★★	★★	★★
BÖHLER K340 ISODUR®	★★★	★★★★★	★★★	★★★	★★★★★
BÖHLER K346	★★★	★★★	★★★	★★★★★	★★
BÖHLER K353	★★	★★★	★★	★★	★★
BÖHLER K360 ISODUR®	★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K390 MICROCLEAN®	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BÖHLER K490 MICROCLEAN®	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BÖHLER K497 MICROCLEAN®	★★★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K888 MATRIX	★★★★★	★★★★★	★★★★★	★★	★★
BÖHLER K890 MICROCLEAN®	★★★★★	★★★★★	★★★★★	★★★	★★★

Teslimat durumu

Annealed	
Sertlik (HB)	maks. 250

Isıl işlem

Annealing

Sıcaklık	800 kadar 850 °C	Slow controlled cooling in furnace at a rate of 10 to 20°C/hr down to approx. 600°C, further cooling in air.
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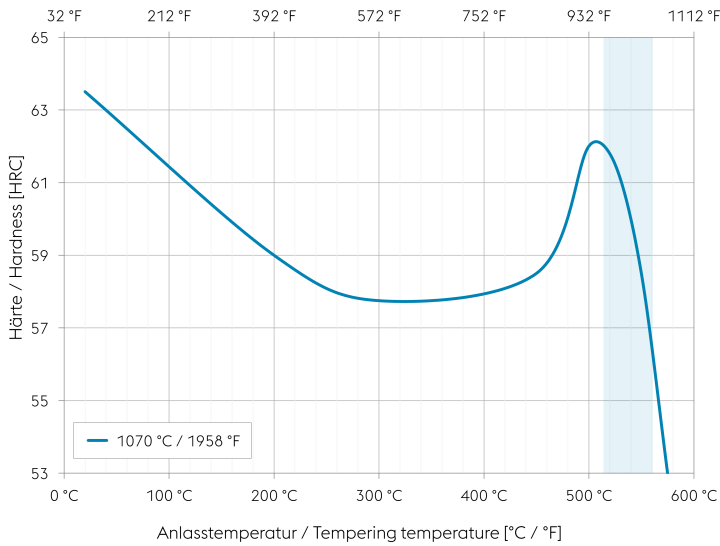
Stress relieving

Sıcaklık	650 kadar 700 °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 to 2 hours.
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Sertleştirme ve Temperleme

Sıcaklık	1.030 kadar 1.070 °C	Complex shapes / air, simple shapes / air blast, oil, salt bath from (220 to 250°C or 500 to 550°C) or gas. 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:

Specimen size: square 0,787 inch (20 mm)

Slow heating to tempering temperature immediately after hardening. Recommended tempering temperature is indicated by the blue area in the chart.

Time in furnace 1 hour for each 0,787 inch (20 mm) of workpiece thickness but at least 2 hours/cooling in air.

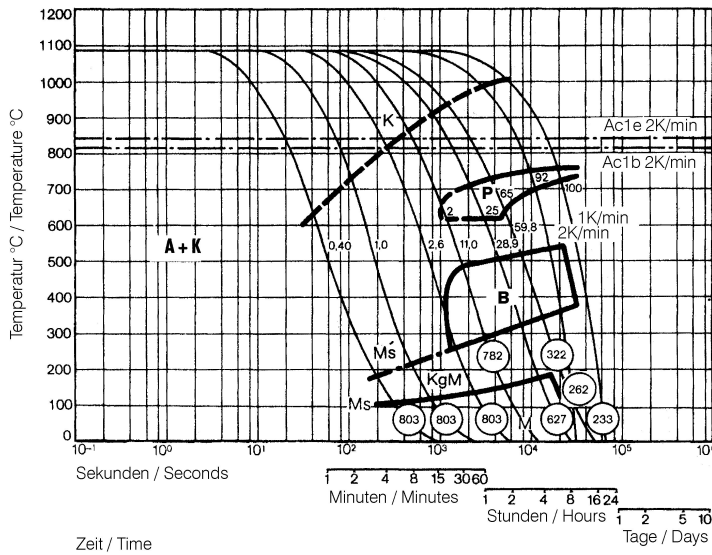
Slow cooling to room temperature after each tempering step is recommended.

Please refer to the tempering chart for guide values for the hardness achievable after tempering.

It is recommended to temper at least three times above the secondary hardness maximum.

Tempering for stress relieving 86 to 122 °F (30 to 50 °C) below the highest tempering temperature.

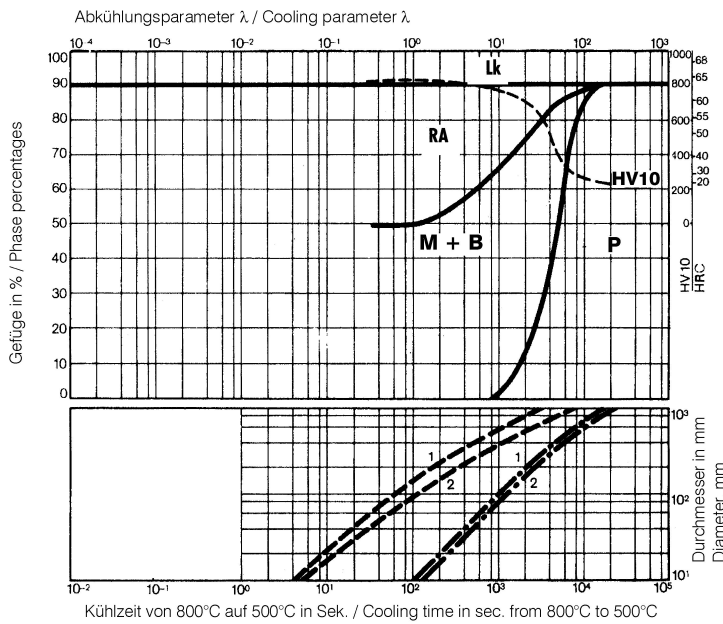
Continuous cooling CCT curves



Austenitising temperature: 1080°C / 1976°F
Holding time: 30 minutes

O Hardness in HV
2...100 phase percentages
0,40...59,8 cooling parameters, i. e. Cooling from 800 - 500°C (1472 - 932°F) in $s \times 10^{-2}$
2...1 K/min cooling rate in K/min in the 800 - 500°C (1472 - 932°F) range
Range of grain boundary martensite formation
KgM... Grain boundary martensite

Quantitative phase diagram

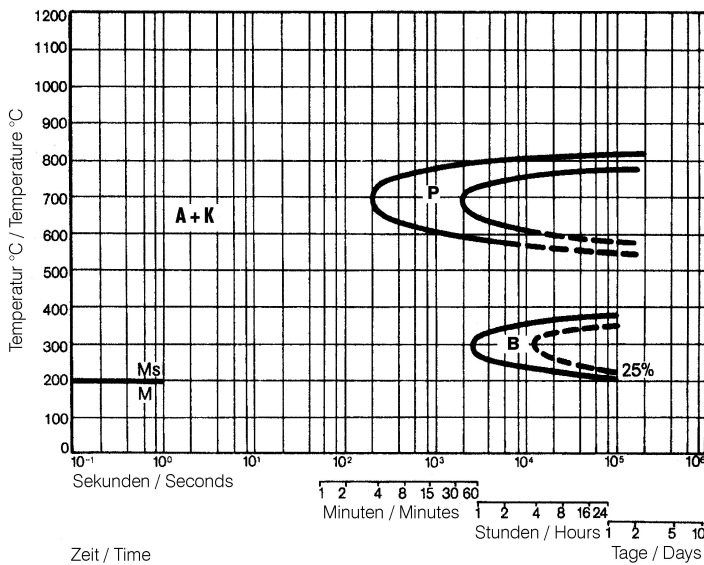


Lk... Ledeburite carbide
RA... Residual austenite
A... Austenite
B... Bainite
P... Pearlite
K... Carbide
M... Martensite

----- Oil cooling
- · - Air cooling

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

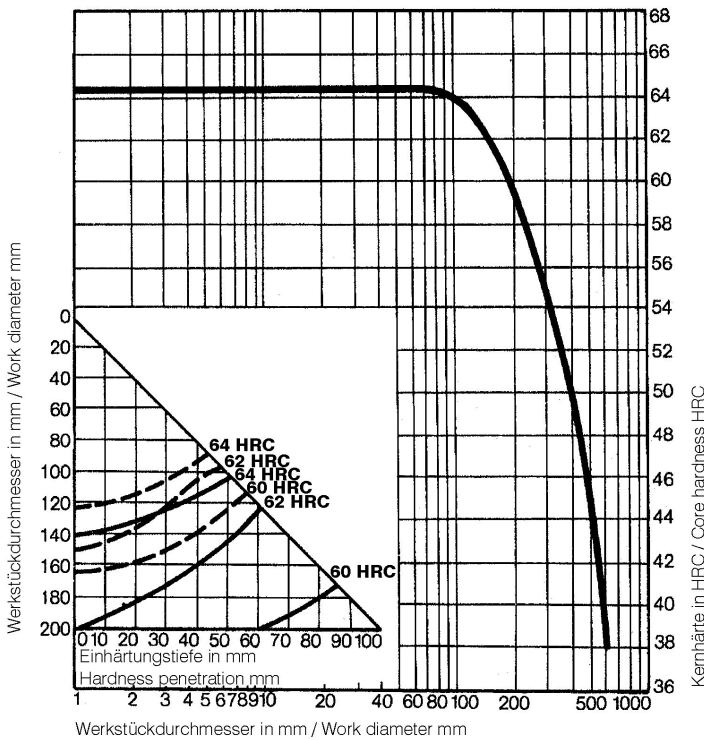
Isothermal TTT curves



Austenitising temperature: 1020°C / 1868°F
Holding time: 30 minutes

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

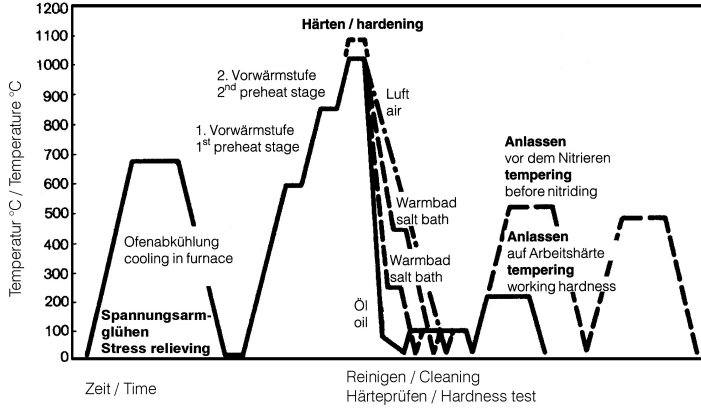
Influence of work diameter on core hardness and hardness penetration



Hardening temperature: 1030°C / 1886°F
Quenchant:

— Oil
- - - Air

Heat treatment sequence



Fiziksel özellikler

Sıcaklık (°C)	20
Yoğunluk (kg/dm ³)	7,67
Termal iletkenlik (W/(m.K))	23,9
Özgül ısı kapasitesi (kJ/kg K)	0,47
Spes. elektrik direnci (Ohm.mm ² /m)	0,65
Elastikiyet modülü (10 ³ N/mm ²)	200

Termal genişmeler

Sıcaklık (°C)	100	200	300	400	500	600	700
Termal genişme (10 ⁻⁶ m/(m.K))	11	11,4	11,9	12,2	12,7	12,8	12,1

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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