

OCELE PRE PRÁCU ZA STUDENA

Dostupné výrobné profily

Tyčové polotovary*
Plechý

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

Popis produktu

BÖHLER K110 - Cr - Mo - V ledeburitická nástrojová oceľ s vysokým obsahom uhlíka a chrómu. Oceľ sa vyznačuje vysokou odolnosťou proti abráziívnemu opotrebovaniu, dobrou húževnatosťou a rozmerovou stálosťou. Kaliteľná na vzduchu, veľmi vhodná pre kalenie vo vákuu.

Spôsob výroby

Konvenčná výroba

Vlastnosti

- > Odolnosť proti opotrebovaniu : dobré
- > Rozmerová stabilita : dobré
- > Oceľ pre prácu za studena kaliteľná na sekundárnu tvrdosť s minimálnou zmenou rozmerov : dobré

Aplikácia

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> > Strojové nože (pre výrobcov) > Razenie > Výroba normalizovaných dielov (strižníky, platne, kolíky, razníky) > Komponenty pre ťažobný priemysel (hriadele, komponenty pre vŕtanie) > Diely pre všeobecné strojárstvo | <ul style="list-style-type: none"> > Valcovanie > Stríhanie / Dierovanie / Lisovanie / Presné strihanie > Závitovky > Valcovanie profilov > Thread rolling (SK) | <ul style="list-style-type: none"> > Tvárnenie za studena > Lisovanie práškov > Komponenty pre recykláciu > Oteruvzdorné diely |
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Technické údaje

Označenie materiálu		Normy	
1.2379	SEL	4957	EN ISO
~T30402	UNS		
X153CrMoV12	EN		
D2	AISI		

Chemické zloženie

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

Porovnanie vlastnosti materiálu

	Odolnosť proti tlakovému zaťaženiu	Rozmerová stabilita počas tepelného spracovania	Húževnatosť	Odolnosť proti abrazívnemu opotrebovaniu	Odolnosť proti adhezívnemu opotrebovaniu
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®	★★★★	★★★★★	★★★★★	★★★	★★★

Stav pri dodaní

Žihany

Tvrdosť (HB)	max. 250
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Tepelné spracovanie

Žihanie

Teplota	800 až 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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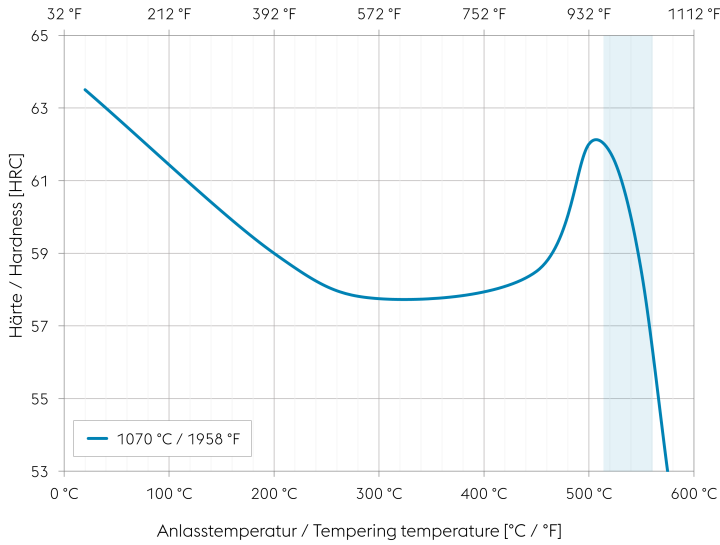
Žihanie na odstránenie pnutí

Teplota	650 až 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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Kalenie a popúšťanie

Teplota	1 030 až 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.

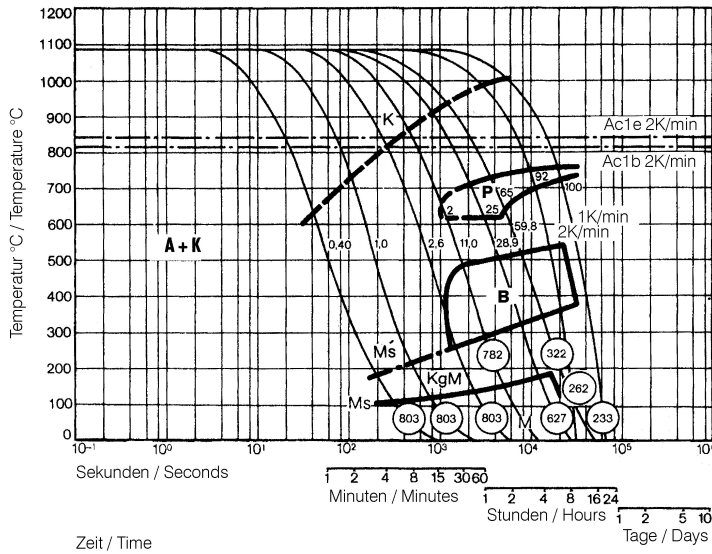
Slow cooling to room temperature after each tempering step is recommended.

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.

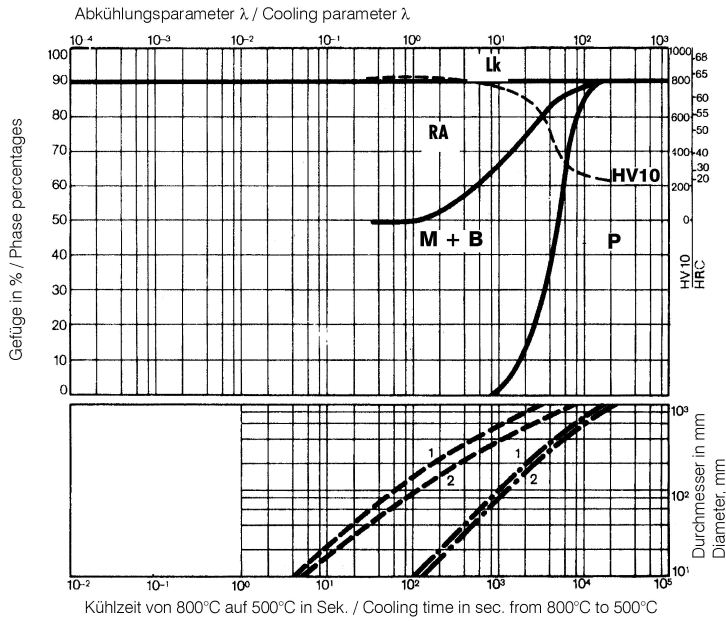
Continuous cooling CCT curves



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

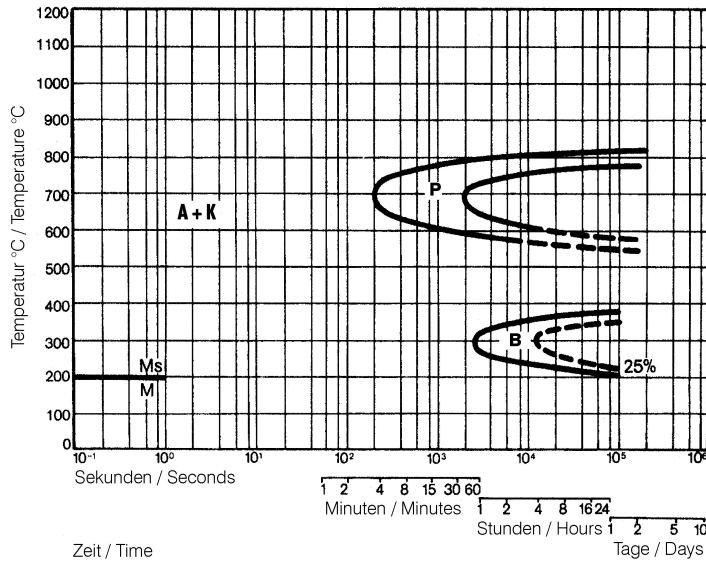
O Hardness in HV
2...100 phase percentages
0,40...59,8 cooling parameters, i. e. Cooling from 800 - 500°C (1472 - 932°F) in $s \times 10^{-2}$
2...1 K/min cooling rate in K/min in the 800 - 500°C (1472 - 932°F) range
Range of grain boundary martensite formation
KgM... Grain boundary martensite

Quantitative phase diagram



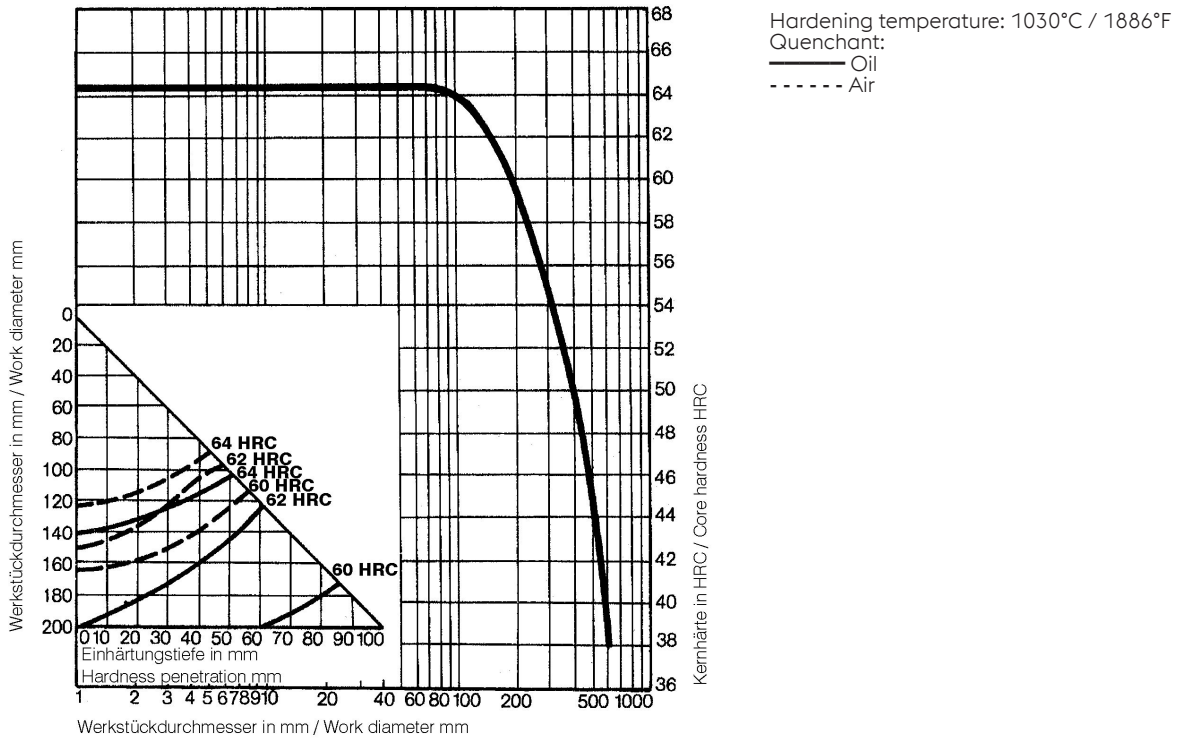
- Lk... Ledeburite carbide
 - RA... Residual austenite
 - A... Austenite
 - B... Bainite
 - P... Pearlite
 - K... Carbide
 - M... Martensite
- - - - Oil cooling
 - · - Air cooling
- 1... Edge or face
 2... Core

Isothermal TTT curves

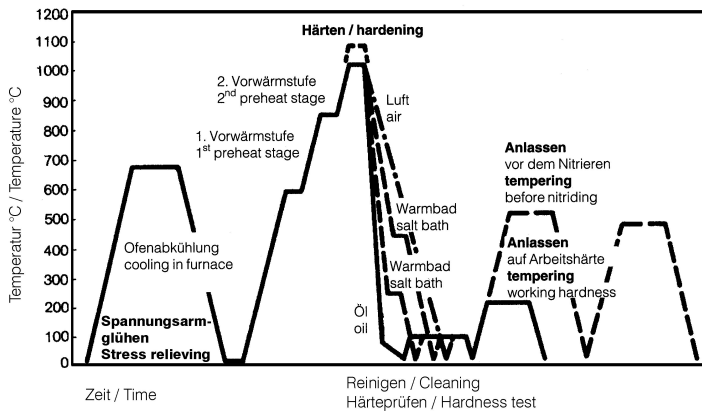


- Austenitising temperature: 1020°C / 1868°F
 Holding time: 30 minutes
- A... Austenite
 - B... Bainite
 - P... Pearlite
 - K... Carbide
 - M... Martensite

Influence of work diameter on core hardness and hardness penetration



Heat treatment sequence



Fyzikálne vlastnosti

Teplota (°C)	20
Hustota (kg/dm ³)	7,67
Tepelná vodivosť (W/(m.K))	23,9
Merná tepelná kapacita (kJ/kg K)	0,47
Merný elektrický odpor (Ohm.mm ² /m)	0,65
Modul pružnosti (10 ³ N/mm ²)	200

Tepelná rozťažnosť

Teplota (°C)	100	200	300	400	500	600	700
Tepelná rozťažnosť (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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