

# ACCIAI DA UTENSILI PER LAVORAZIONE A FREDDO

## Granulometria disponibile

 Prodotti lunghi\*

 Lamiere

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

## Descrizione del prodotto

Acciaio da utensile con ottima tenacità e resistenza adusura. Eccellente resistenza al rinvenimento.

## Percorso di fusione

 Airmelted

## Proprietà

- > Durezza e duttilità : alto
- > Resistenza all'usura : buono
- > Resistenza alla compressione : alto
- > Stabilità dimensionale : buono

## Applicazioni

- > Stampaggio a freddo
- > Tranciatura / Tranciatura fine / Stampaggio

## Dati tecnici

Corrispondenze	
~1.2345	SEL
~X50CrMoV5-1	EN

## Analisi chimica

C	Si	Mn	Cr	Mo	V
0,51	0,95	0,30	5,00	1,40	1,40

## Proprietà del materiale

	Resistenza alla compressione	Stabilità dimensionale durante il trattamento termico	Tenacità	Abrasivo resistente all'usura
<b>BÖHLER K306</b>	★★★★	★★★	★★★★	★★★
<b>BÖHLER K305</b>	★★★★★	★★★	★★	★★★★★
<b>BÖHLER K313</b>	★★★★	★★★	★★★	★★★
<b>BÖHLER K320</b>	★★★	★★★	★★★	★★★
<b>BÖHLER K329</b>	★★★	★★★	★★★★★	★★★★★
<b>BÖHLER K600</b>	★	★★★	★★★★★	★
<b>BÖHLER K601</b>	★	★★★	★★★★★	★★
<b>BÖHLER K605</b>	★★	★★★	★★★★★	★

## Condizioni di consegna

### Ricotto

Durezza (HB)	max. 240
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## Trattamento termico

### Annealing

Temperatura	750 a 800 °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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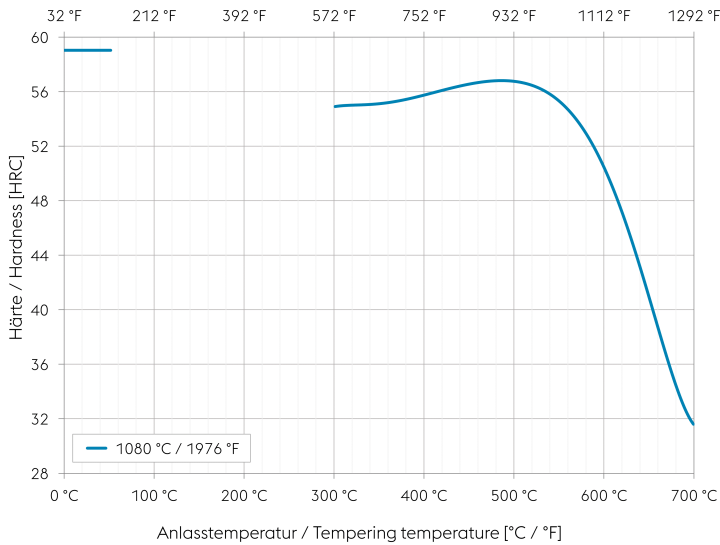
### Alleviare lo stress

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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### Tempra e rinvenimento

Temperatura	1.050 a 1.100 °C	Oil, salt bath 932 to 1022°F (500 - 550°C), air. (For maximum toughness, lower hardening temperature range) 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.

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

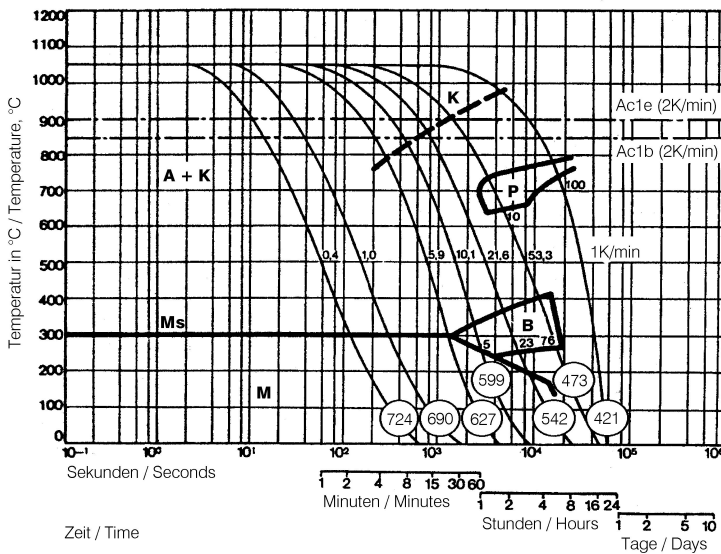
Please refer to the tempering chart for guide values for the hardness achievable after tempering.

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

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

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

### Continuous cooling CCT curves



Austenitising temperature: 1050°C  
Holding time: 15 minutes

O Vickers hardness

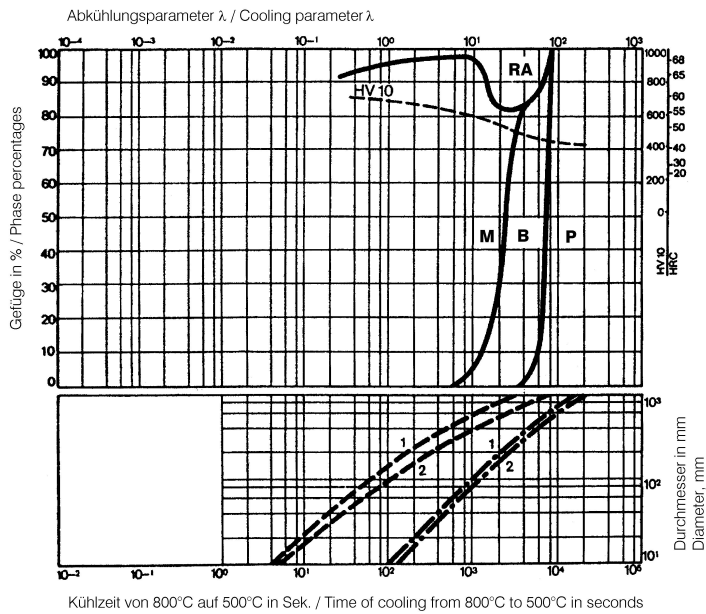
10...100 phase percentages

0.4...53.3 cooling parameter, i.e. duration of cooling from 800°C to 500°C in  $s \times 10^{-2}$

1K/min...cooling rate in K/min in the 800°C to 500°C range

724, 690, 627, 599, 542, 473, 421, 123, 76, 5, 100

Quantitative phase diagram

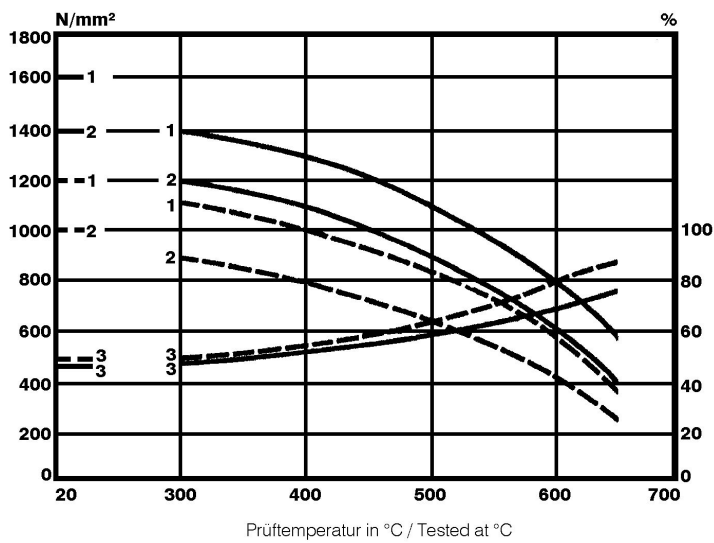


A... Austenite  
B... Bainite  
K... Carbide  
M... Martensite  
P... Pearlite  
RA... Residual austenite

----- Oil cooling  
- · - Air cooling

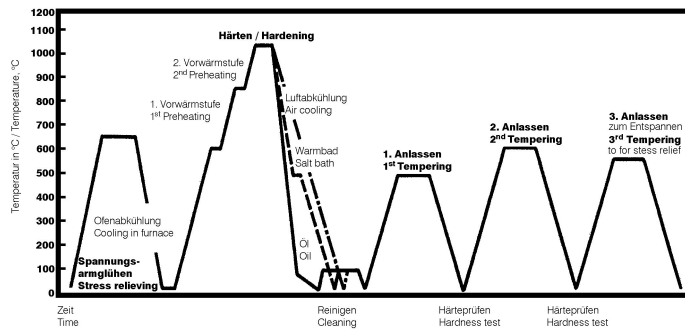
1... Edge or face  
2... Core

Hot strength chart



— heat treated 1600 N/mm<sup>2</sup>  
- - - - - heat treated 1200 N/mm<sup>2</sup>  
1... Tensile strength N/mm<sup>2</sup>  
2... 0.2 proof stress N/mm<sup>2</sup>  
3... Reduction of area %

## Heat treatment sequence



## Proprietà fisiche

Temperatura (°C)	20
Densità (kg/dm <sup>3</sup> )	7,8
Conducibilità termica (W/(m.K))	25
Capacità termica specifica (kJ/kg K)	0,46
Resistenza elettrica specifica (Ohm.mm <sup>2</sup> /m)	0,52
Modulo di elasticità (10 <sup>3</sup> N/mm <sup>2</sup> )	215

## Espansioni termiche

Temperatura (°C)	100	200	300	400	500
Espansione termica ( $10^{-6}$ m/(m.K))	11,5	12	12,2	12,5	12,9

**Long Products:** For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

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