

# COLD WORK TOOL STEELS

## Application Segments

Cold Work

## Available Product Variants

Long Products\*

Plates

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

## Product Description

BÖHLER K605 is approximately equivalent to the material 1.2721 (~50NiCr13). The alloy concept of this tool steel is similar to the one of 1.2767. With its high nickel content, this material offers a very good combination of through hardenability and toughness. The higher carbon content compared to material 1.2721 results in a better hardening response and consequently higher compressive strength. The material is used in applications such as forming, bending and embossing tools.

## Process Melting

Airmelted

## Properties

- > Toughness & Ductility : high
- > Dimensional stability : good

## Applications

- > Machine knife (for producers)
- > Cold Forming
- > Coining
- > Fine Blanking, Stamping, Blanking
- > Standard Parts (Molds, Plates, Pins, Punches)
- > General Components for Mechanical Engineering
- > Components for the recycling industry
- > Tool Holders (milling, drilling, turning & chucks)

## Technical data

Material designation	
~1.2721	SEL
~50NiCr13	EN

## Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	Ni
0.55	0.30	0.40	1.00	0.25	3.00

## Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive
BÖHLER K605	★★	★★★	★★★★★	★
BÖHLER K305	★★★★★	★★★	★★	★★★★★
BÖHLER K306	★★★★★	★★★	★★★★★	★★★★
BÖHLER K313	★★★★★	★★★	★★★	★★★★
BÖHLER K320	★★★	★★★	★★★	★★★★
BÖHLER K329	★★★	★★★	★★★★★	★★★★★
BÖHLER K600	★	★★★	★★★★★	★
BÖHLER K601	★	★★★	★★★★★	★★

## Delivery condition

### Annealed

Hardness (HB)	max. 250
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## Heat treatment

### Annealing

Temperature	610 to 650 °C	Slow controlled cooling in furnace at a rate of 10 to 20 °C/hr (18 to 36 °F/hr) down to approximately 600 °C (1112 °F)    Further cooling in air.
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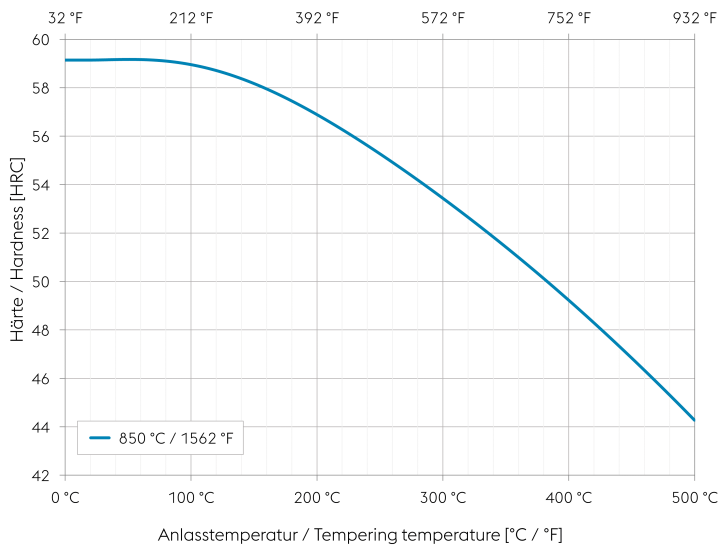
### Stress relieving

Temperature	650 °C	After through heating, hold in neutral atmosphere for 1-2 hours.    Slow cooling in furnace    Intended to relieve stresses caused by extensive machining or in complex shapes.
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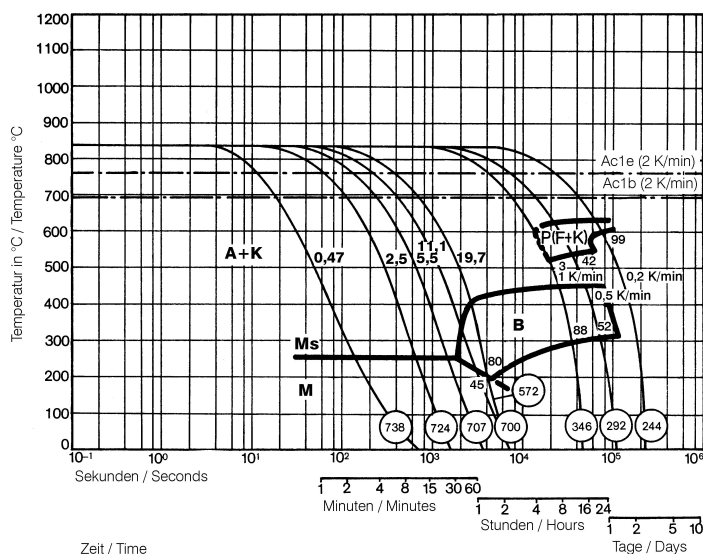
### Hardening and Tempering

Temperature	840 to 870 °C	Quenching: Oil, air.    Holding time after temperature equalization: 15 to 30 minutes.    After hardening, tempering to the desired working hardness according to the tempering chart.
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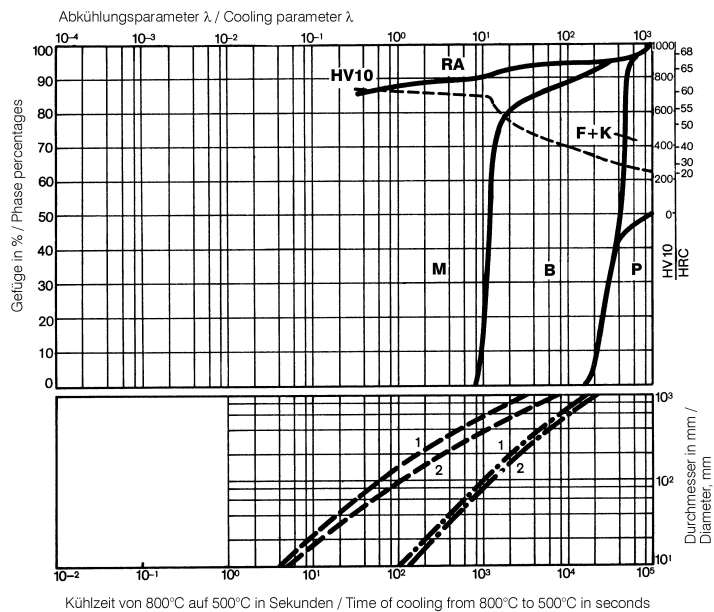
## Tempering chart



## Continuous cooling CCT curves



## Quantitative phase diagram



HV10... Vickers Hardness

RA... Residual austenite

F... Ferrite

K... Carbide

M... Martensite

B... Bainite

P... Pearlite

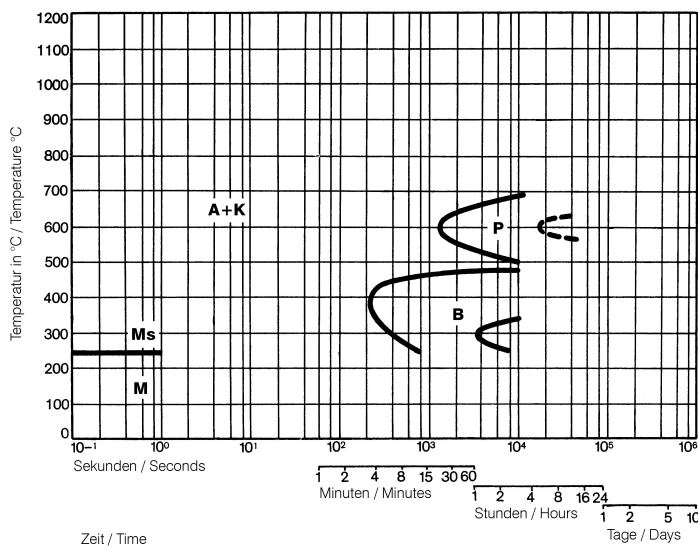
--- Oil cooling

... Air cooling

1... Edge or face

2... Core

## Isothermal TTT curves



Austenitising temperature: 840 °C / 1544 °F  
Holding time: 20 minutes

A... Austenite

K... Carbide

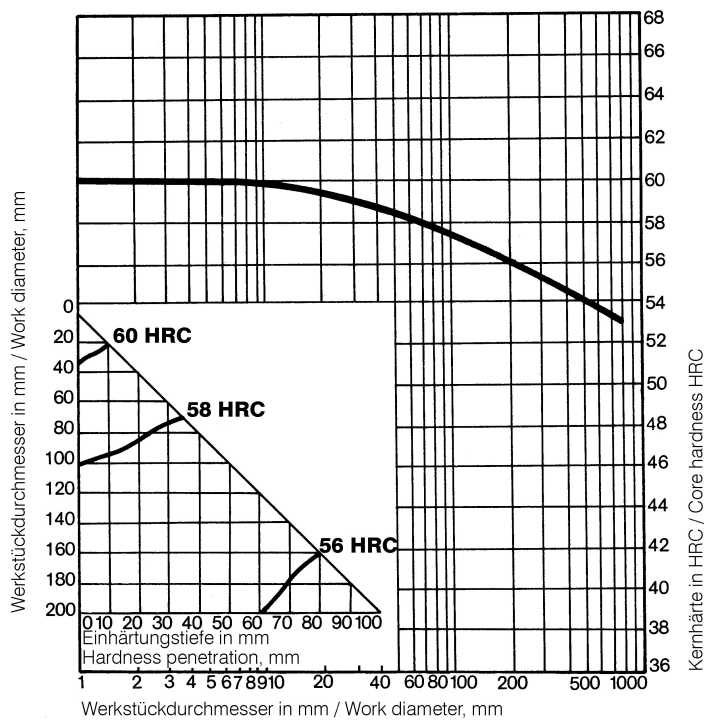
P... Pearlite

B... Bainite

M... Martensite

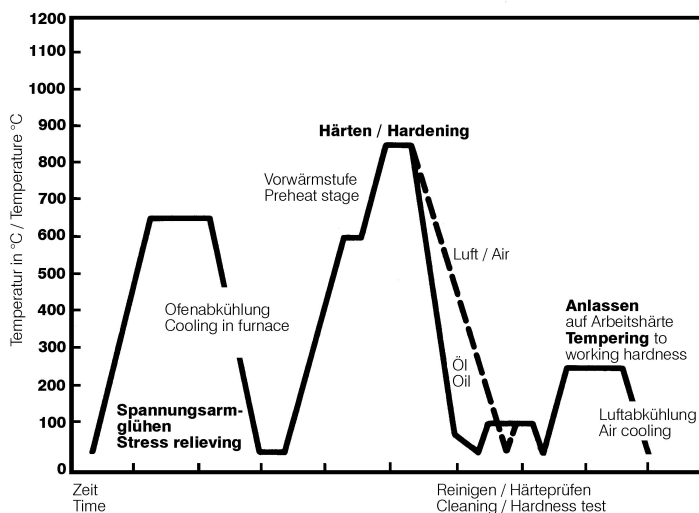
Ms... Martensite starting temperature

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



Quenched from: 850 °C / 1562 °F  
Quenchant: Oil

## Heat treatment sequence



## Physical Properties

Temperature (°C)	20
Density (kg/dm <sup>3</sup> )	7.85
Thermal conductivity (W/(m.K))	28
Specific heat (kJ/kg K)	0.46
Spec. electrical resistance (Ohm.mm <sup>2</sup> /m)	0.3
Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup> )	210

## Thermal Expansions between 20°C | 68°F and ...

Temperature (°C)	100	200	300	400	500
Thermal expansion (10 <sup>-6</sup> m/(m.K))	11	12.5	13	13.5	14

If other available product variants are listed in addition to long products, please note that these may differ in terms of melting process, technical data, delivery and surface condition as well as available product dimensions. For mandatory technical specifications, other requirements and dimensions, please contact our regional voestalpine BÖHLER sales companies. The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. Measurement data are laboratory values and can deviate from practical analyses. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.