COLD WORK TOOL STEELS

Application Segments

Cold Work

Available Product Variants

Long Products* | Plates

* Presented data refer exclusivly 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)
- Fine Blanking, Stamping, Blanking
- Components for the recycling industry
- Cold Forming
- Standard Parts (Molds, Plates, Pins, Punches)
- Tool Holders (milling, drilling, turning & chucks)
- Coining
- General Components for Mechanical Engineering

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

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.

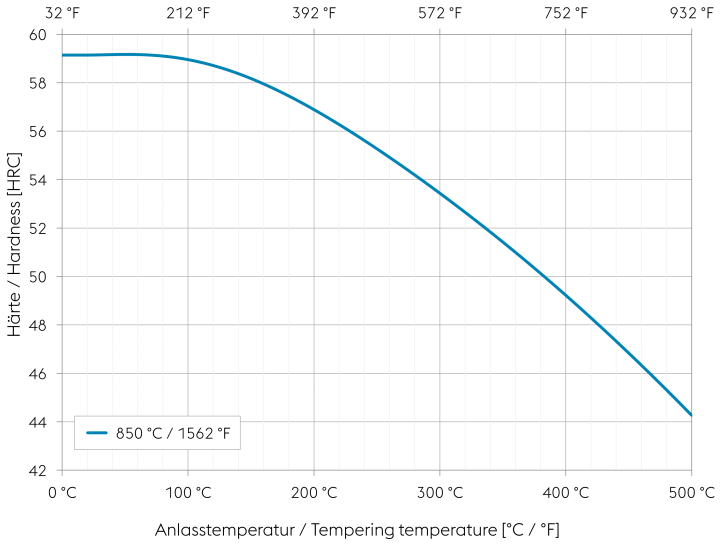
Stress relieving

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.

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.

Tempering chart



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

Slow heating to tempering temperature immediately after hardening.

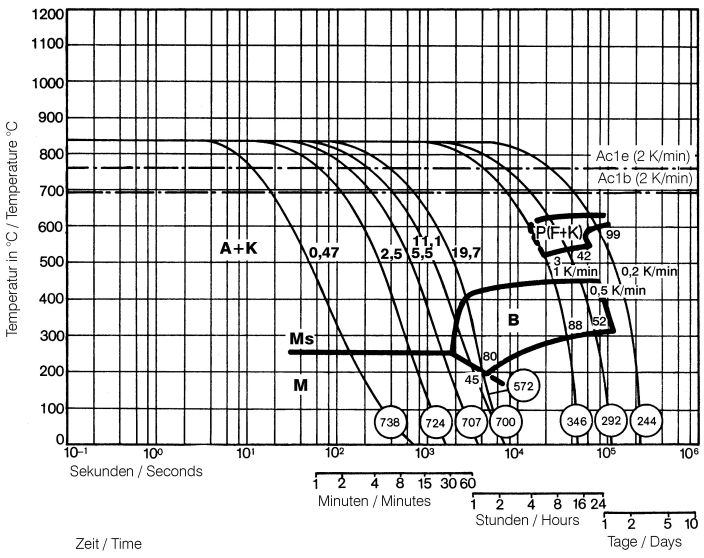
Time in furnace 1 hour for each 20 mm (0,787 inch) of workpiece thickness but at least 2 hours.

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

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

Cooling in air after each tempering step is recommended.

Continuous cooling CCT curves



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

○ Vickers hardness

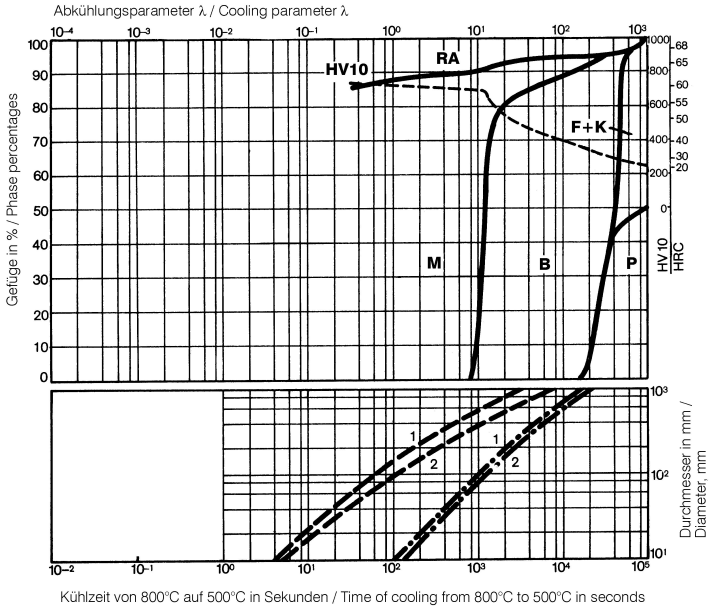
3...99 phase percentages

0.47...19.7 cooling parameter λ, i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in s x 10^{-2}

1...0.2 K/min ... cooling rate in the range of 800 to 500 °C (1472 to 932 °F)

A… Austenite
K… Carbide
P… Perlite
B... Bainite
M… Martensite
Ms… Martensite starting temperature

Quantitative phase diagram

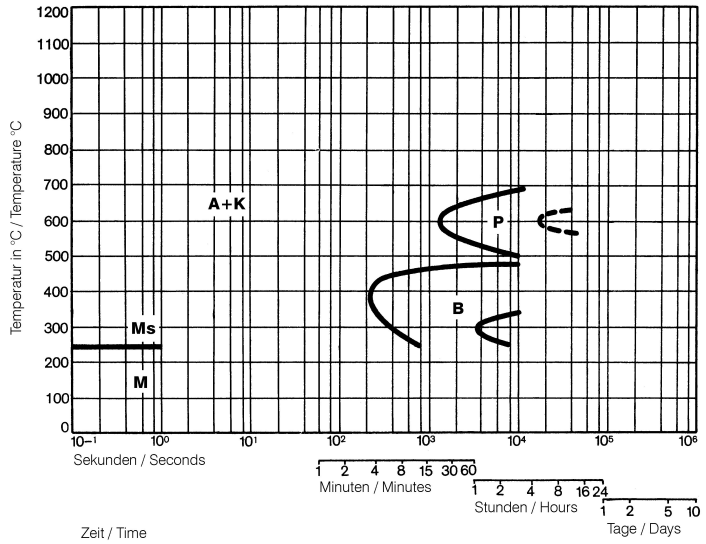


HV10... Vickers Hardness
RA... Residual austenite
F... Ferrite
K... Carbide
M... Martensite
B... Bainite
P... Perlite

- - - Oil cooling
- • - Air cooling

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

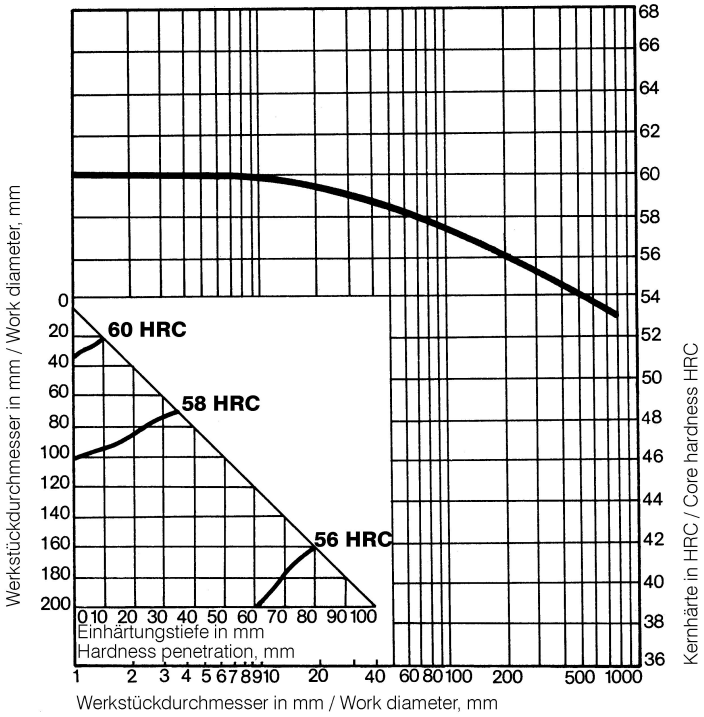
Isothermal TTT curves



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

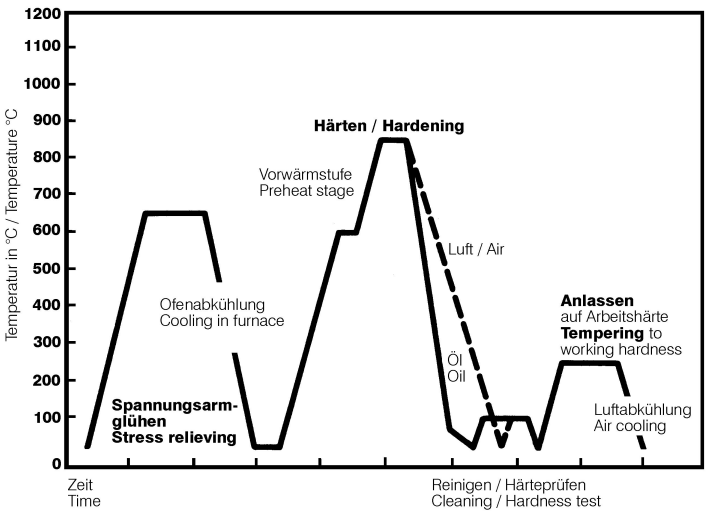
A... Austenite
K... Carbide
P... Perlite
B... Bainite
M... Martensite
Ms... Martensite starting temperature

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/dm³)	7.85
Thermal conductivity (W/(m.K))	28
Specific heat (kJ/kg K)	0.46
Spec. electrical resistance (Ohm.mm²/m)	0.3
Modulus of elasticity (10³N/mm²)	210

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

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

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ONE STEP AHEAD.