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 K600 corresponds to the material 1.2767 (45NiCrMo16). With its high nickel content, this material offers a very good combination of through hardenability and toughness. This results in a high resistance to impact and shock loads. BÖHLER K600 is used for a wide range of tools where high toughness is required. The material is used for forming and bending tools, cold shear blades for thick materials and for reinforcement rings. Due to its good polishability, BÖHLER K600 is also used for embossing tools, plastic molds and mold inserts for injection molding.

Process Melting

Airmelted

Properties

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

Applications

- Machine knife (for producers)
- Fine Blanking, Stamping, Blanking
- Industrial Knives
- Mineral Processing
- Crankshafts
- Gears
- Cold Forming
- Standard Parts (Moulds, Plates, Pins, Punches)
- Wear Applications
- Drilling
- Driveshafts
- Packaging industry
- Coining
- Components for the recycling industry
- Pumping
- Clamping
- Mechanical Engineering
- Cold Forming / Coining

Technical data

Material designation	
1.2767	SEL
45NiCrMo16	EN
SKT6	JIS

Standards	
4957	EN ISO

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	Ni
0.48	0.23	0.40	1.30	0.25	4.00

Material characteristics

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

Delivery condition

Annealed

Hardness (HB)	max. 285 |

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.

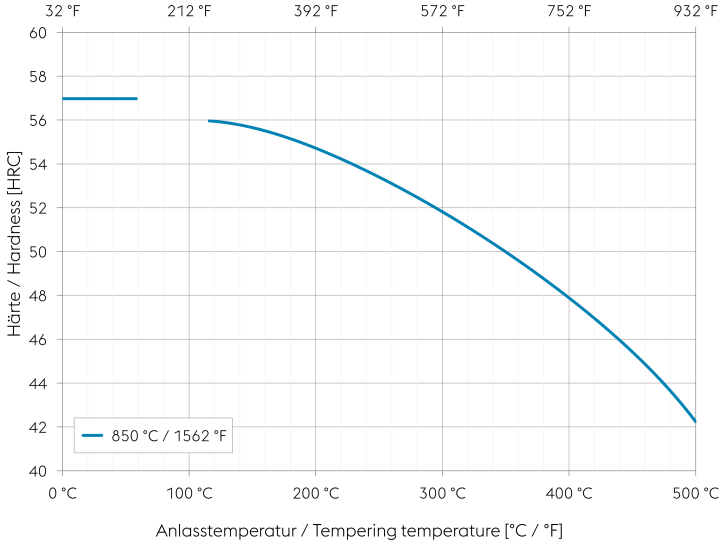
Stress relieving

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, salt bath (300 to 400 °C | 572 to 752 °F), 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.

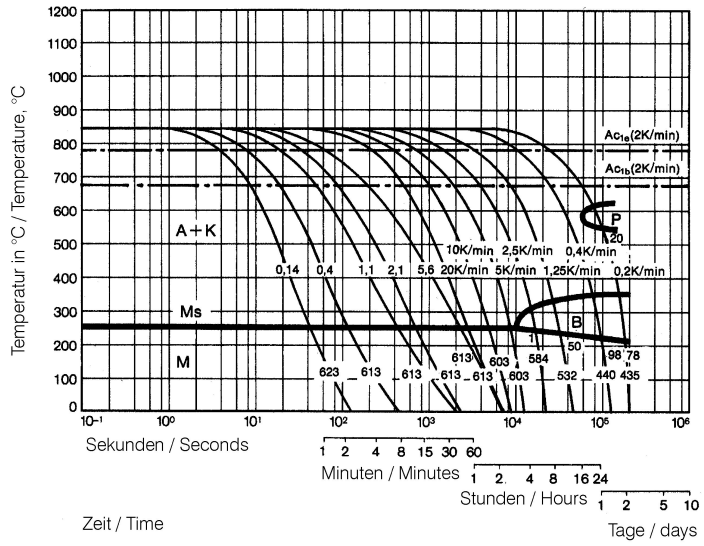
Time in furnace 1 hour for each 20 mm (0,787 inch) of workpiece thickness but at least 2 hours.

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: 15 minutes

◯ Vickers hardness

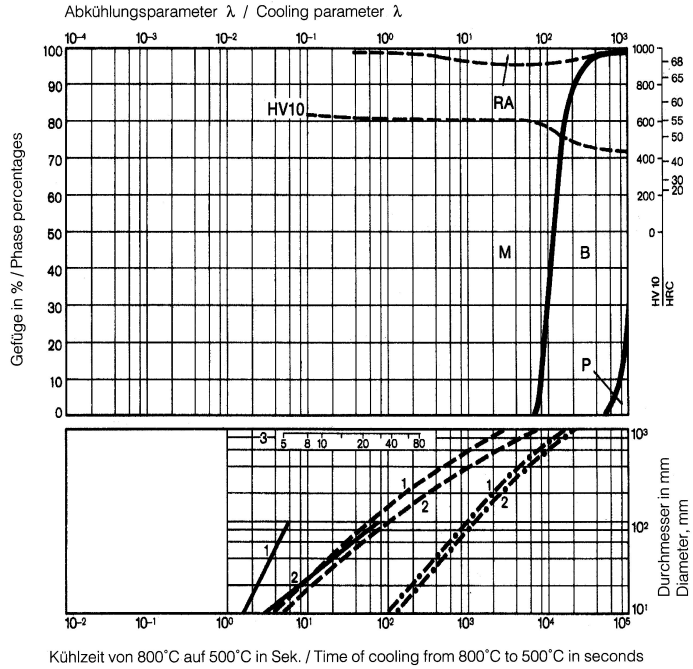
1...98 phase percentages

0.14...5.6 cooling parameter λ, i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in s x 10^{-2}

20...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

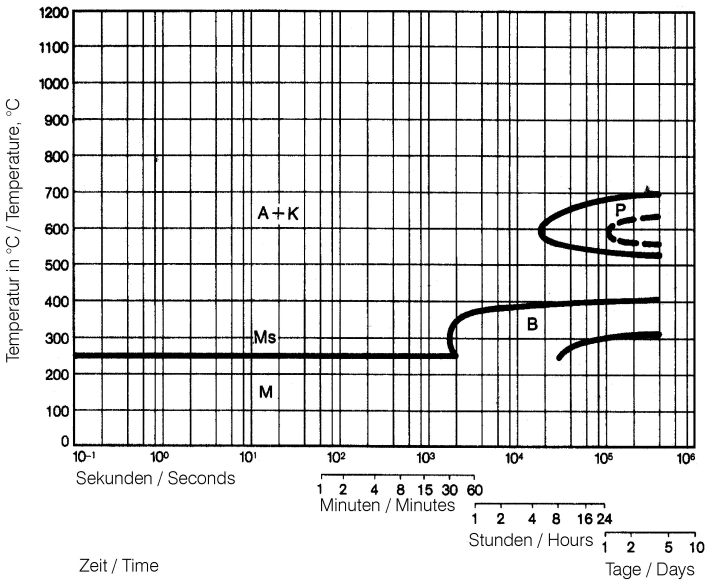


HV10… Vickers Hardness
RA... Residual austenite
M... Martensite
B... Bainite
P... Perlite

—— Water cooling
- - - Oil cooling
- • - Air cooling

1... Edge or face
2... Core
3... Jominy test: distance from end

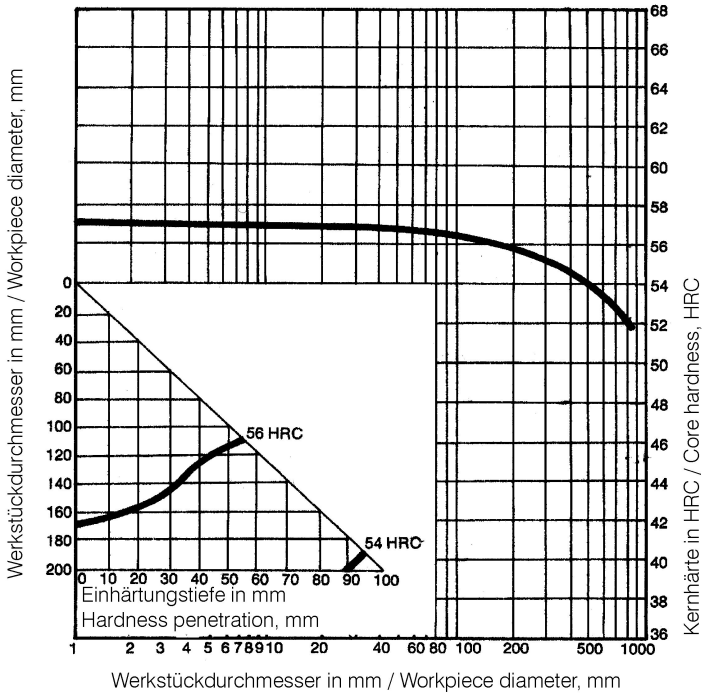
Isothermal TTT curves



Austenitising temperature: 840 °C / 1544 °F
Holding time: 15 minutes

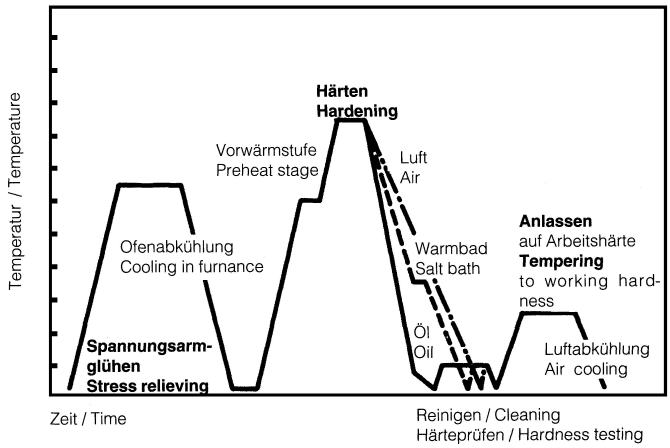
A… Austenite
K… Carbide
P… Perlite
B... Bainite
M… Martensite
Ms… Martensite starting temperature

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

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.

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