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 K107 is a 12% ledeburitic chromium steel and corresponds to material number 1.2436 (X210CrW12). Due to the higher tungsten content, BÖHLER K107 achieves a higher resistance to abrasive wear compared to the conventional tool steel 1.2080. Compared to modern cold work tool steels, BÖHLER K107 has the advantage of simple heat treatment with lower hardening temperatures and single tempering. However, this characteristic tempering behaviour limits the use of modern coatings..

Process Melting

Airmelted

Properties

- Wear Resistance : good

Applications

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

Technical data

Material designation	
1.2436	SEL
X210CrW12	EN
~ D6	AISI

Standards	
4957	EN ISO

Chemical composition (wt. %)

C	Si	Mn	Cr	W
2.10	0.25	0.40	11.50	0.70

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive	Wear resistance adhesive
BÖHLER K107	★★	★★	★	★★★	★★
BÖHLER K100	★★	★★	★	★★★	★★
BÖHLER K105	★★	★★	★	★★	★★
BÖHLER K110	★★	★★★	★	★★★	★★
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	★★★★	★★★★★	★★★★★	★★★	★★★

Delivery condition

Annealed

Hardness (HB)	max. 250

Heat treatment

Annealing

Temperature	800 to 850 °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.

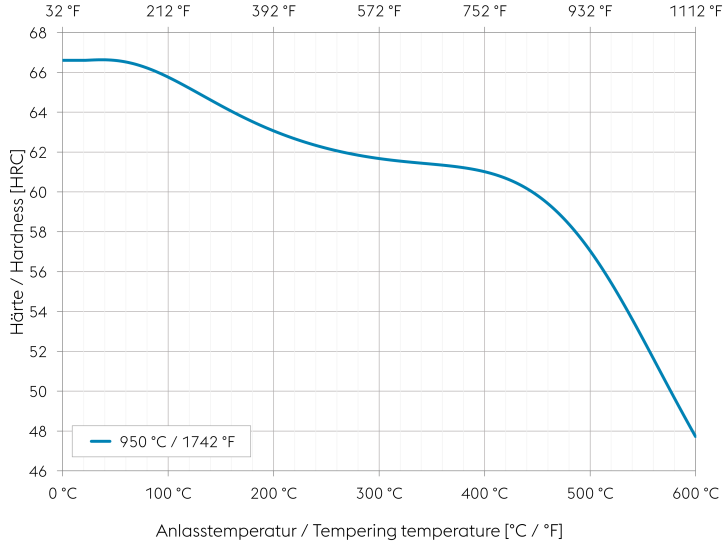
Stress relieving

Temperature	650 to 700 °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	950 to 980 °C	Quenching: Oil, salt bath (220 to 250 °C or 500 to 550 °C | 428 to 482 °F or 932 to 1022 °F), gas, air. Tools of intricate shape or with sharp edges should preferably be hardened in air or salt bath. || 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.

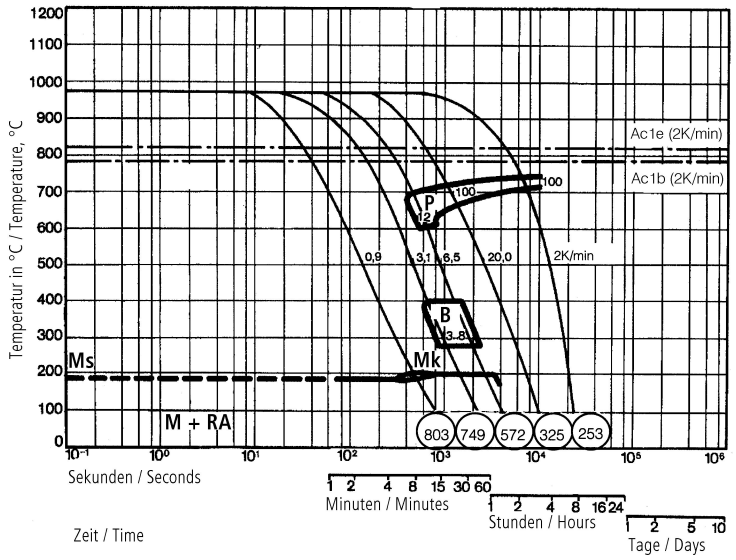
Time in furnace 1 hour for each 20 mm (0,787 inch) of workpiece thickness but at least 2 hours.

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.

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

Continuous cooling CCT curves



Austenitising temperature: 980 °C (1796 °F)
Holding time: 30 minutes

◯ Vickers hardness

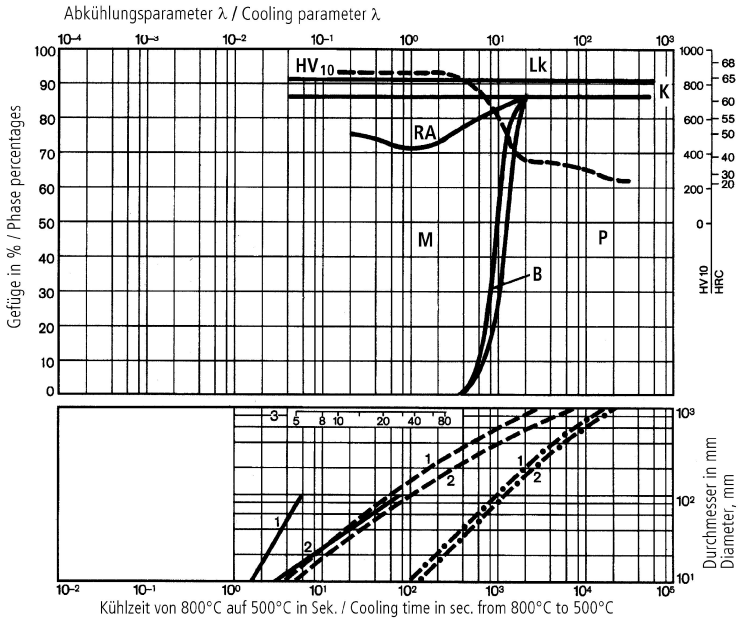
3...100 phase percentages

0.9...20.0 cooling parameter λ, i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in s x 10^{-2}

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

P… Perlite
B…Bainite
M… Martensite
Mk… Grain boundary martensite
RA… Retained austenite
Ms… Martensite starting temperature

Quantitative phase diagram

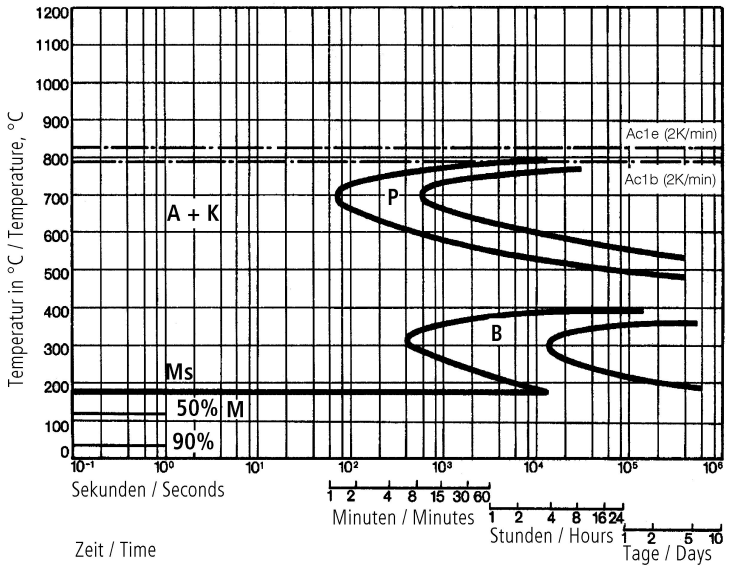


HV10… Vickers Hardness
Lk... Ledeburite carbide
K... Carbide
RA... Residual austenite
M... Martensite
B... Bainite
P... Perlite

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

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

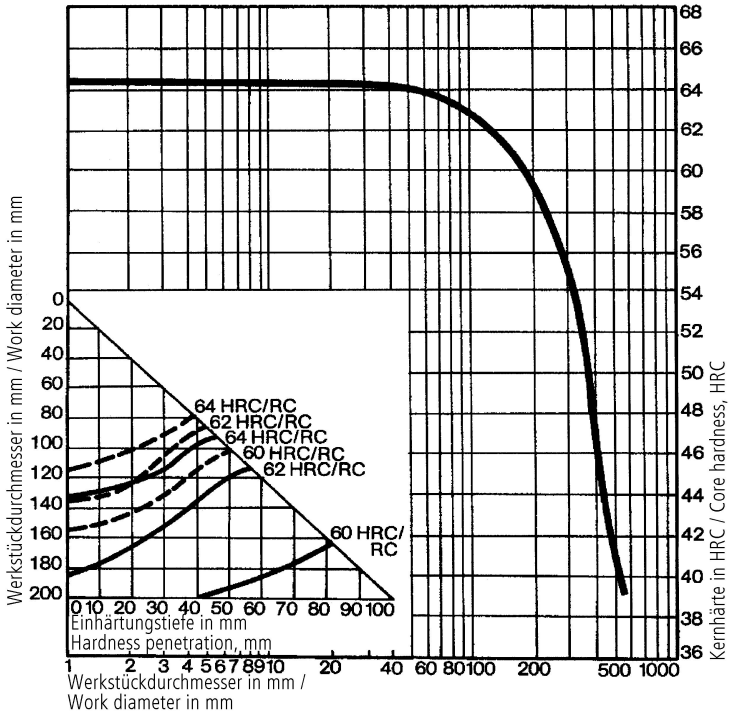
Isothermal TTT curves



Austenitising temperature: 980 °C / 1796 °F
Holding time: 30 minutes

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

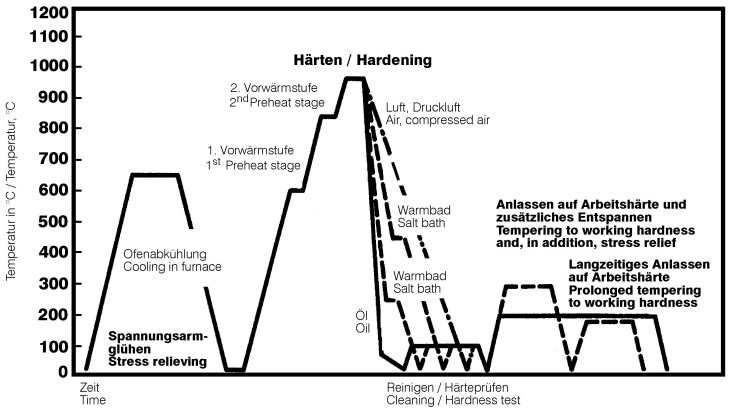
Influence of work diameter on core hardness and hardness penetration



Quenched from: 950 °C / 1742 °F

Quenchant:
——— Oil
- - - - - - Air

Heat treatment sequence



Physical Properties

Temperature (°C)	**20**
Density (kg/dm³)	7.7
Thermal conductivity (W/(m.K))	20
Specific heat (kJ/kg K)	0.46
Spec. electrical resistance (Ohm.mm²/m)	0.65
Modulus of elasticity (10³N/mm²)	210

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

Temperature (°C)	100	200	300	400	500	600
Thermal expansion (10^{-6} m/(m.K))	10.5	11	11	11.5	12	12

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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