

COLD WORK STEELS

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 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
- > Rolling
- > Standard Parts (Molds, Plates, Pins, Punches)
- > General Components for Mechanical Engineering
- > Cold Forming
- > Components for Recycling Industry

Technical data

Material designation		Standards	
1.2436	SEL	4957	EN ISO
X210CrW12	EN		
~ D6	AISI		

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 1,472 to 1,562 °F	Slow controlled cooling in furnace at a rate of 50 - 68°F/hr (10 to 20°C/hr) down to approx. 1112°F (600°C), further cooling in air.
-------------	-----------------------------------	--

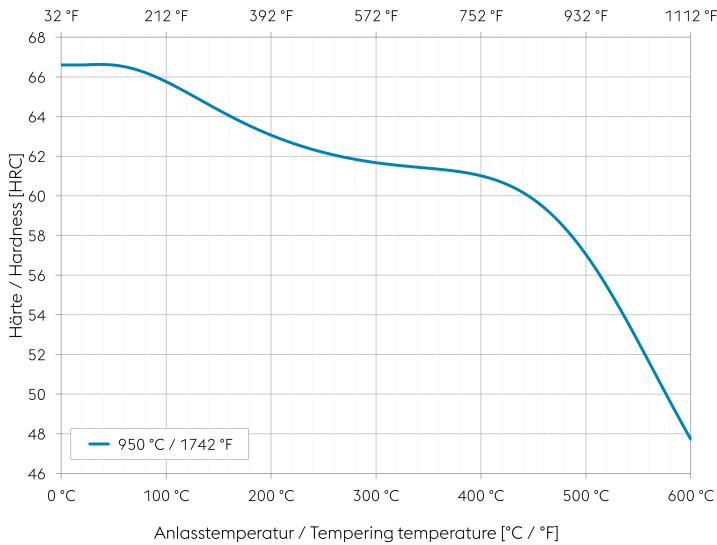
Stress relieving

Temperature	650 to 700 °C 1,202 to 1,292 °F	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
-------------	-----------------------------------	--

Hardening and Tempering

Temperature	950 to 980 °C 1,742 to 1,796 °F	Oil, salt bath 428 to 482°F or 932 to 1022°F (220 to 250°C or 500 to 550°C), air, oil, still air, gas; Holding time after temperature equalization: 15 to 30 minutes. Special treatment: Hardening 1868°F (1020°C) and tempering at 932°F (500°C). After hardening, tempering to the desired working hardness, see tempering chart.
-------------	-----------------------------------	---

Tempering chart



Tempering:

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

Slow heating to tempering temperature immediately after hardening.

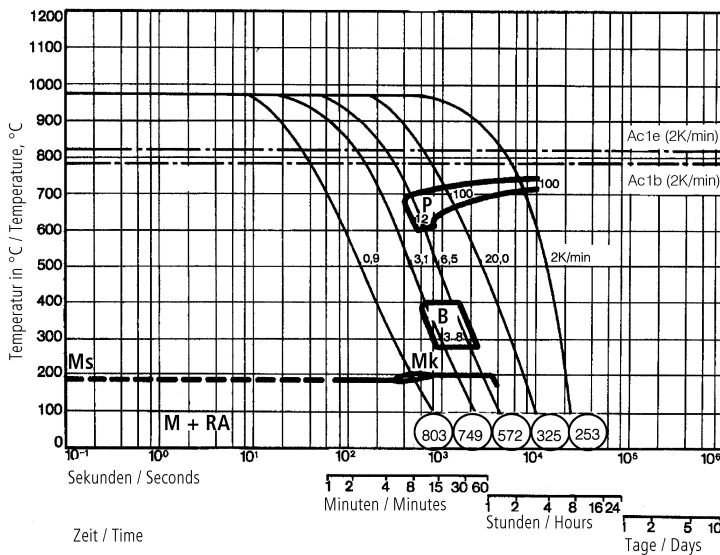
Time in furnace 1 hour for each 0,787 inch (20 mm) of workpiece thickness but at least 2 hours/cooling in air.

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

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

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

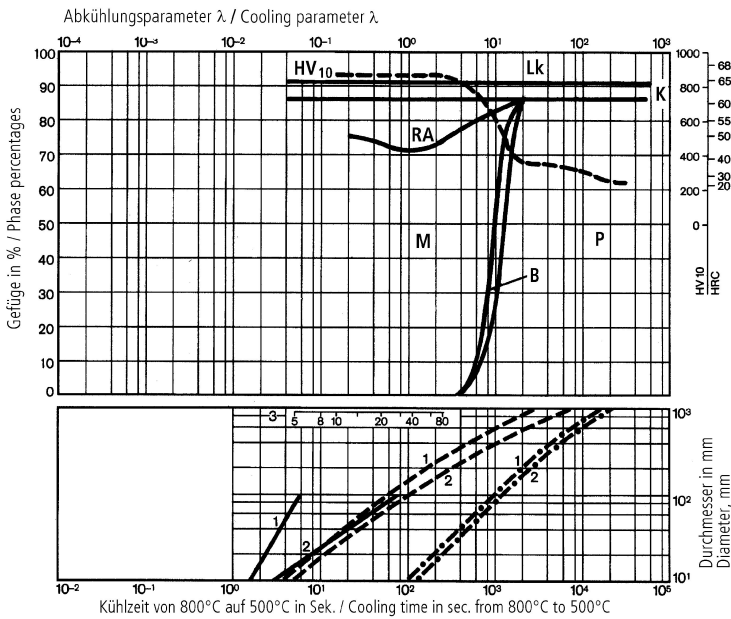
Continuous cooling CCT curves



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

O Vickers hardness
3...100 phase percentages
0.9...20.0 cooling parameter, i.e. duration of cooling from 1472 to 932°F (800 to 500°C) in $s \times 10^{-2}$
35,6°F/min (2 K/min) cooling rate in °F/min (K/min) in the 1472 to 932°F (800 to 500°C) range
Mk... Grain boundary martensite

Quantitative phase diagram

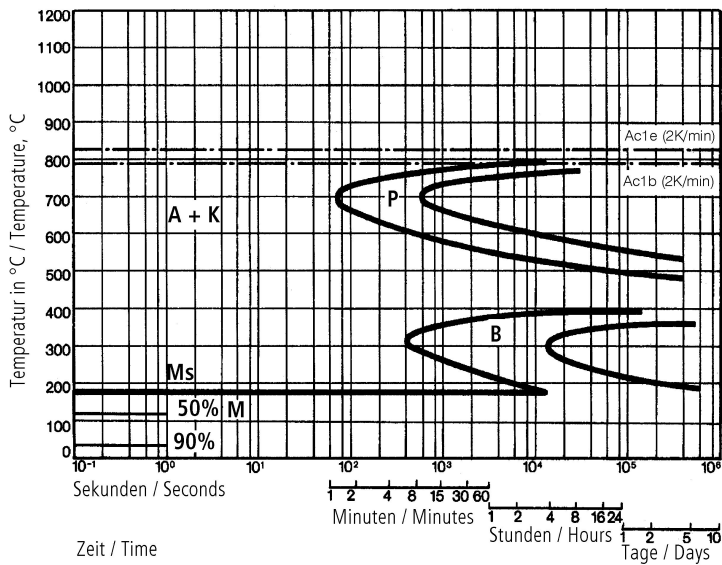


Lk... Ledeburite carbide
 RA... Residual austenite
 A... Austenite
 B... Bainite
 P... Perlite
 K... Carbide
 M... Martensite

— Water cooling
 - - - Oil cooling
 - · - Air cooling

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

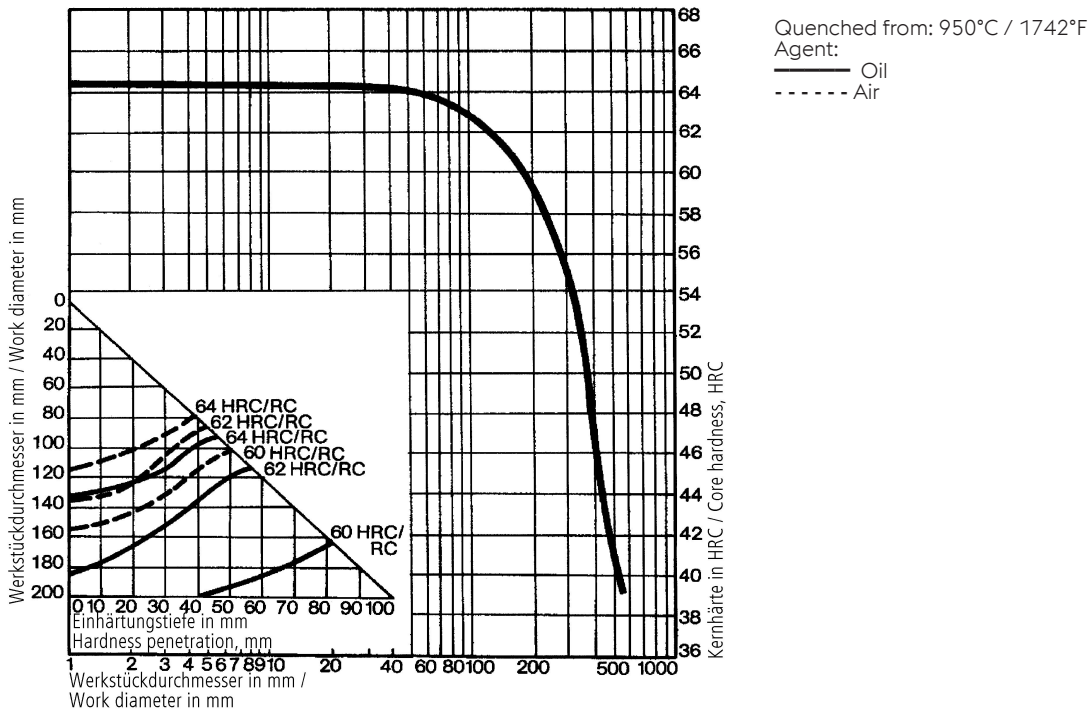
Isothermal TTT curves



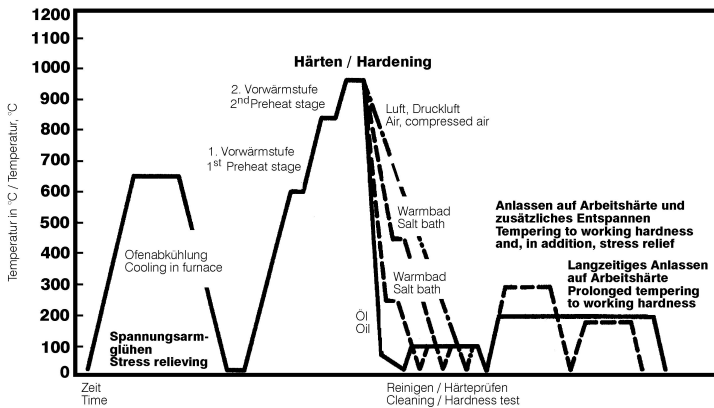
Austenitising temperature: 980°C / 1796°F
 Holding time: 30 minutes

A... Austenite
 B... Bainite
 P... Pearlite
 K... Carbide
 M... Martensite

Influence of work diameter on core hardness and hardness penetration



Heat treatment sequence



Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	7.7 0.28
Thermal conductivity (W/(m.K) BTU/ft h °F)	20 11.56
Specific heat (kJ/kg K BTU/lb °F)	0.46 0.1099
Spec. electrical resistance (Ohm.mm ² /m 10 ⁻⁴ Ohm.inch ² /ft)	0.65 3.07
Modulus of elasticity (10 ³ N/mm ² 10 ³ ksi)	210 30.46

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

Temperature (°C °F)	100 212	200 392	300 572	400 752	500 932	600 1,112
Thermal expansion (10 ⁻⁶ m/(m.K) 10 ⁻⁶ inch/inch. °F)	10.5 5.8	11 6.1	11 6.1	11.5 6.4	12 6.7	12 6.7

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

Sheet & Plates: Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact voestalpine BÖHLER Bleche GmbH & Co KG.

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.