

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 K460 corresponds to the material 1.2510 (100MnCrW4, O1) and has comparable properties to the popular tool steel 1.2842. Additional alloying with tungsten achieves higher resistance to abrasive wear compared to the tool steel 1.2842. BÖHLER K460 offers the advantage of simple heat treatment with low hardening temperatures and single tempering. However, this characteristic tempering behaviour limits the use of advanced coatings. The material has a good hardening response, but only moderate through hardenability. BÖHLER K460 is used for punching and cutting tools, plastic molds, thread cutting tools and machine knives in the wood, paper and recycling industries.

Process Melting

[Airmelted](#)

Properties

- > Toughness & Ductility : high
- > Wear Resistance : good
- > Compressive strength : very high
- > Dimensional stability : good
- > Grindability : high

Applications

- > Cold Forming
- > Fine Blanking, Stamping, Blanking
- > Standard Parts (Molds, Plates, Pins, Punches)

Technical data

Material designation		Standards	
1.2510	SEL	4957	EN ISO
T31501	UNS	A681	ASTM
100MnCrW4	EN		
O1	AISI		
~SKS3	JIS		

Chemical composition (wt. %)

C	Si	Mn	Cr	V	W
0.95	0.25	1.10	0.55	0.10	0.55

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive
BÖHLER K460	★★★★	★	★★★★★	★★
BÖHLER K245	★★	★	★★★★★	★
BÖHLER K455	★★★	★	★★★★★	★
BÖHLER K720	★★	★	★★★★★	★

Delivery condition

Annealed

Hardness (HB)	max. 220
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Heat treatment

Annealing

Temperature	710 to 750 °C 1,310 to 1,382 °F	Slow controlled cooling in furnace at a rate of 50 to 68°F/hr (10 to 20°C/hr) down to approx. 1112°F (600°C), further cooling in air.
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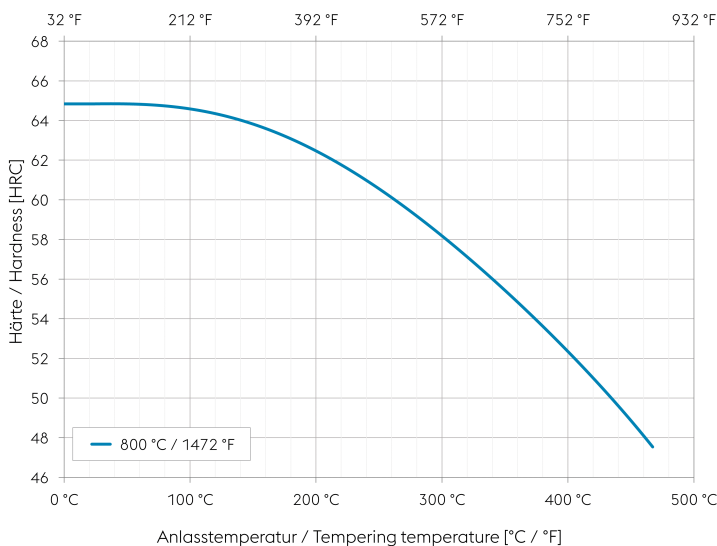
Stress relieving

Temperature	650 °C 1,202 °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.
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Hardening and Tempering

Temperature	780 to 820 °C 1,436 to 1,508 °F	Oil. Salt bath 392 to 482°F (200 to 250°C), up to 0,787 inch (20 mm) thickness. Holding time after temperature equalization: 15 to 30 minutes. After hardening, tempering to the desired working hardness, see tempering chart.
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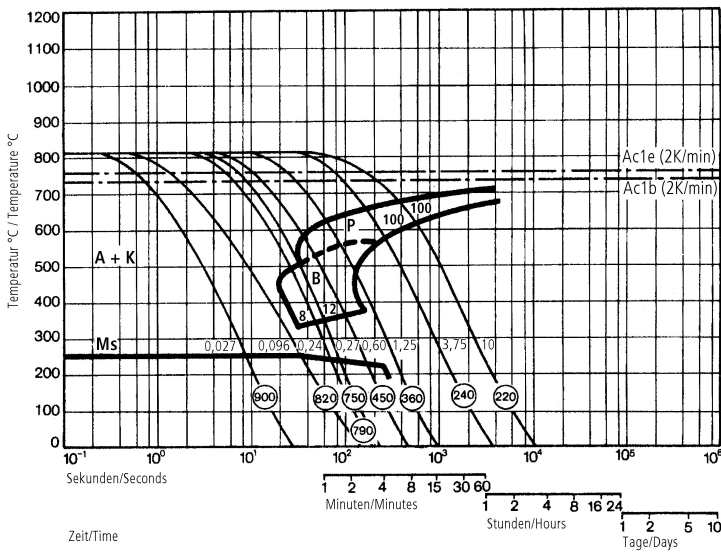
Tempering chart



Tempering:

Hardening temperature:
 800°C
 Specimen size: square 20 mm

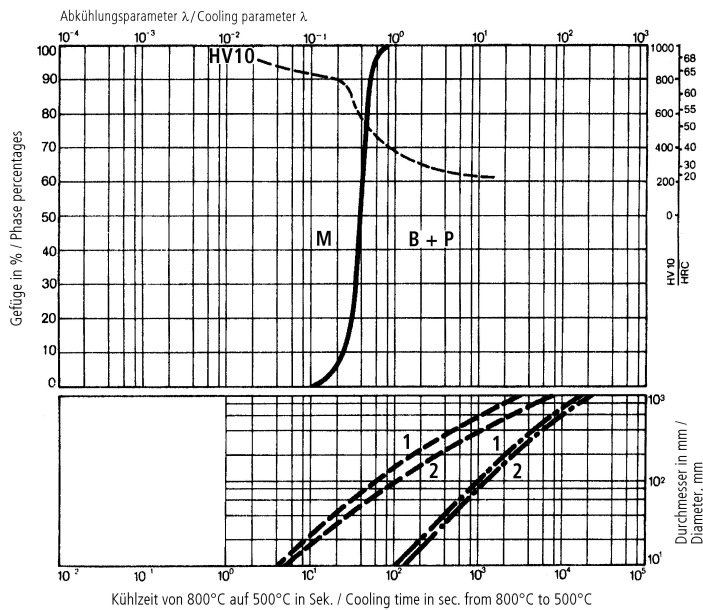
Continuous cooling CCT curves



Austenitising temperature: 1490°F (810°C)
Holding time: 15 minutes

O Vickers hardness
8...100 phase percentages
0.027...10 cooling parameter (λ), i.e. duration of cooling from 1472 to 932°F (800 to 500°C) in s x 10⁻²

Quantitative phase diagram

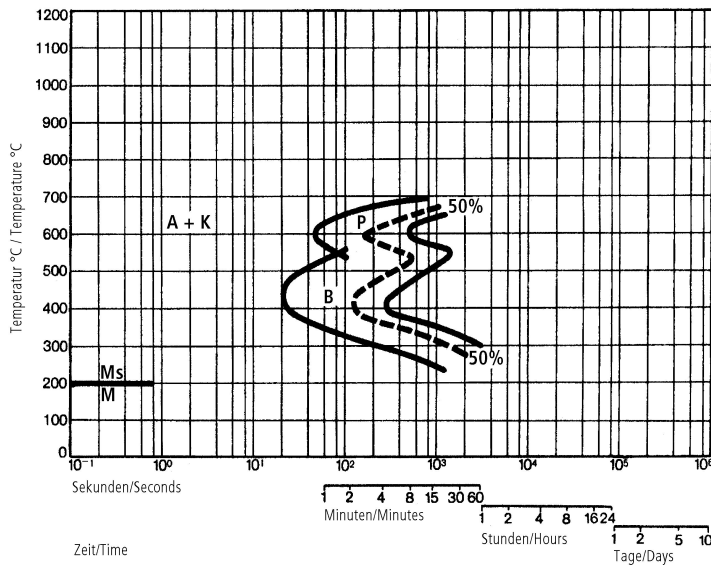


A... Austenite
B... Bainite
K... Carbide
M... Martensite
P... Pearlite

----- Oil cooling
- · - Air cooling

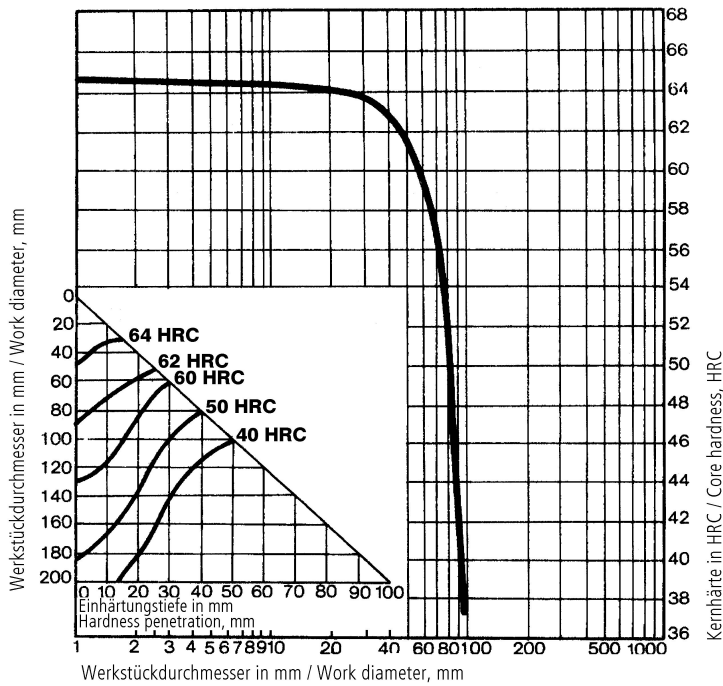
1... Edge or face
2... Core

Isothermal TTT curves



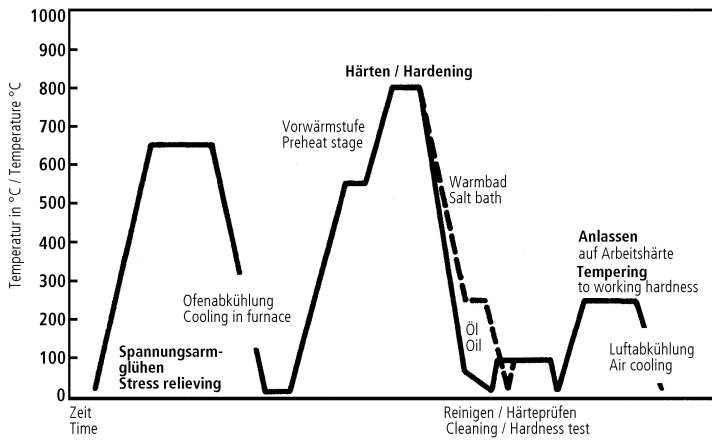
Austenitising temperature: 810°C / 1490°F
Holding time: 15 minutes

Influence of work diameter on core hardness and hardness penetration



Quenched from: 800°C / 1472°F
Agent: Oil

Heat treatment sequence



Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	7.85 0.28
Thermal conductivity (W/(m.K) BTU/ft h °F)	30 17.33
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)	0.35 1.65
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
Thermal expansion (10^{-6} m/(m.K) 10^{-6} inch/inch.°F)	11.5 6.4	12 6.7	12.2 6.8	12.5 6.9	12.8 7.1

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.

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