COLD WORK STEELS

Available Product Shapes

Long Products | Open Die Forgings | Plates

Product Description

Standard grade of dimensionally stable ledeburitic, high carbon, high chromium (12%) tool steels.

Properties

- Wear Resistance: good

Applications

- Machine knife (for producers)
- Fine Blanking, Stamping, Blanking
- Rolls
- Rolling
- Standard Parts (Molds, Plates, Pins, Punches)
- Wear parts
- Cold Forming
- Components for Recycling Industry
- General Components for Mechanical Engineering

Technical data

Material designation	
1.2080	SEL
~T30403	UNS
X210Cr12	EN
~D3	AISI
~SKD1	JIS

Standards	
4957	EN ISO

Chemical composition (wt. %)

C	Si	Mn	Cr
2	0.25	0.35	11.5

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive	Wear resistance adhesive
BÖHLER K100	★★	★★	★	★★★	★★
BÖHLER K105	★★	★★	★	★★	★★
BÖHLER K107	★★	★★	★	★★★	★★
BÖHLER K110	★★	★★★	★	★★★	★★
BÖHLER K190 MICROCLEAN	★★★★	★★★★★	★★★★	★★★★	★★★★
BÖHLER K294 MICROCLEAN	★★★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K340 ISODUR	★★★	★★★★	★★★	★★★	★★★★
BÖHLER K340 ECOSTAR	★★★	★★★	★★	★★	★★
BÖHLER K360 ISODUR	★★★	★★★★	★★★	★★★★	★★★★
BÖHLER K346	★★★	★★★	★★★	★★★★	★★
BÖHLER K353	★★	★★★	★★	★★	★★
BÖHLER K390 MICROCLEAN	★★★★★	★★★★★	★★★★	★★★★★	★★★★★
BÖHLER K890 MICROCLEAN	★★★★	★★★★★	★★★★★	★★★	★★★
BÖHLER K490 MICROCLEAN	★★★★	★★★★★	★★★★	★★★★	★★★★
BÖHLER K497 MICROCLEAN	★★★★★	★★★★★	★★★	★★★★★	★★★★★

Delivery condition

Annealed

Hardness	max. 248 HB

Air Quenched

Heat treatment

Annealing

Temperature (°C | °F)	800 | 1472 to 850 | 1562	Slow controlled cooling in furnace at a rate of 50 to 68°F (10 to 20°C/hr) down to approx. (600°C), further cooling in air.

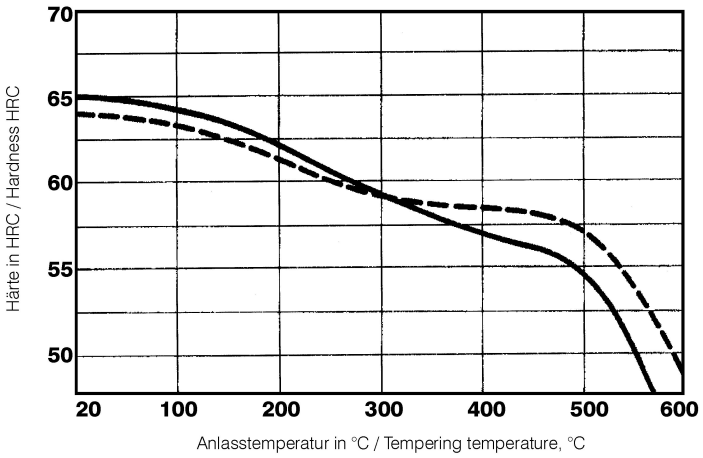
Stress relieving

Temperature (°C | °F)	650 | 1202	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 (°C | °F)	940 | 1724 to 970 | 1778	Oil, salt bath 428 to 482°F or 932 to 1022°F (220 to 250°C or 500 to 550°C), compressed or still air if thickness does not exceed 0,98 inch (25 mm) and if hardening temperature is on the upper side of the range, gas Holding time after temperature equalization: 15 to 30 minutes. After hardening, tempering to the desired working hardness, see tempering chart.

Tempering chart



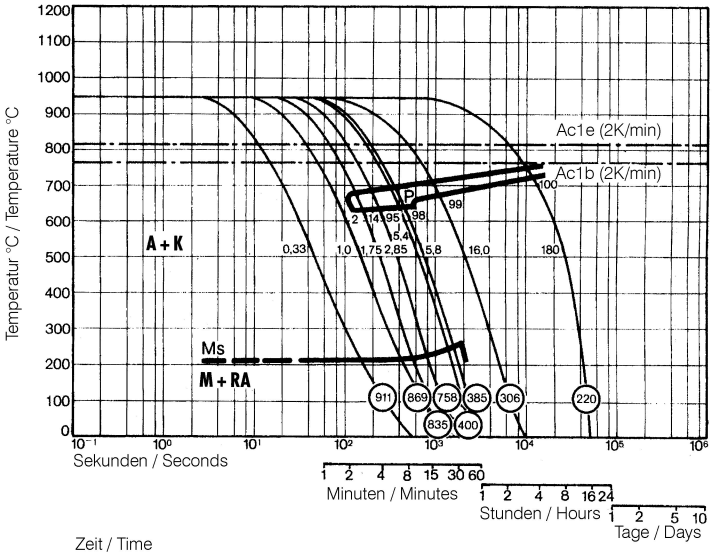
Tempering:

Hardening temperature:
——— 1742°F (950°C)
- - - - - - 1832°F(1000°C)
Specimen size: square 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.

For certain cases we recommend to reduce tempering temperature and increase holding time.

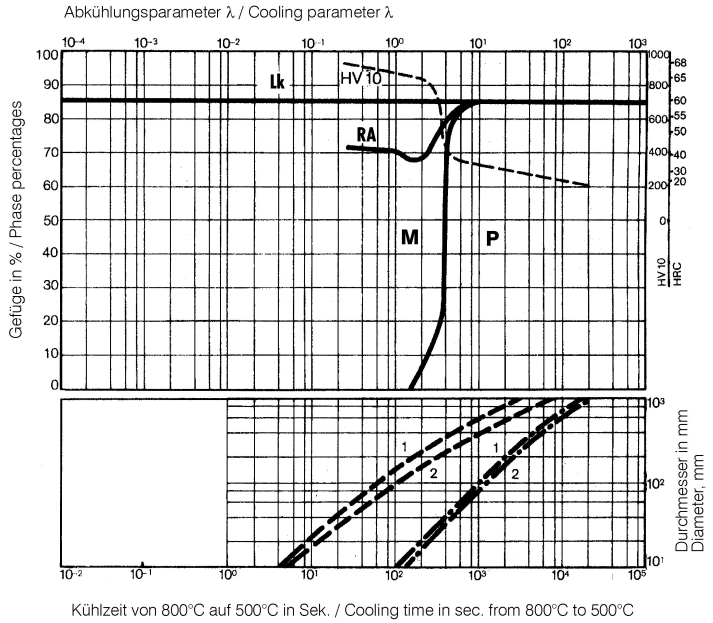
Continuous cooling CCT curves



Austenitising temperature: 1742°F (950°C)
Holding time: 30 minutes

O Vickers hardness
2...100 phase percentages
0.33...180 cooling parameter, i.e. duration of cooling from 1472 to 932°F (800 to 500°C) in s x 10^{-2}
35,6°F/min (2K/min)... cooling rate in K/min in the 1472 to 932°F (800 to 500°C) range

Quantitative phase diagram

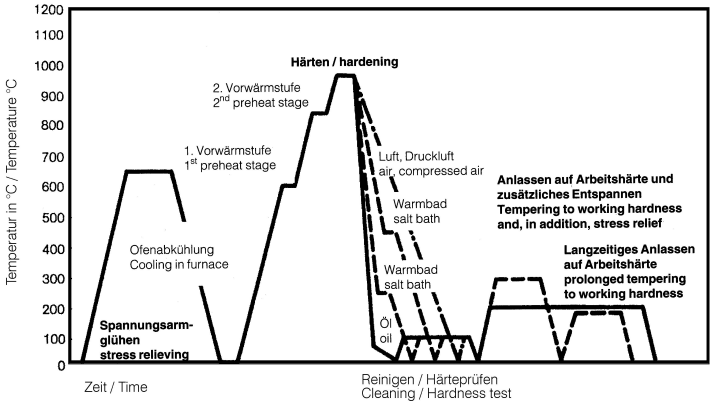


Lk... Ledeburite carbide
RA... Residual austenite
A... Austenite
M... Martensite
P... Perlite
K... Carbide

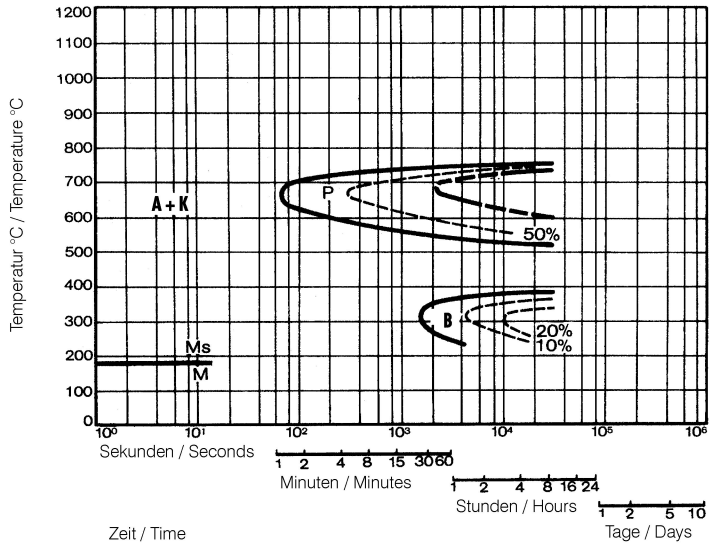
- - - - - - Oil cooling
- • - Air cooling

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

Heat treatment sequence

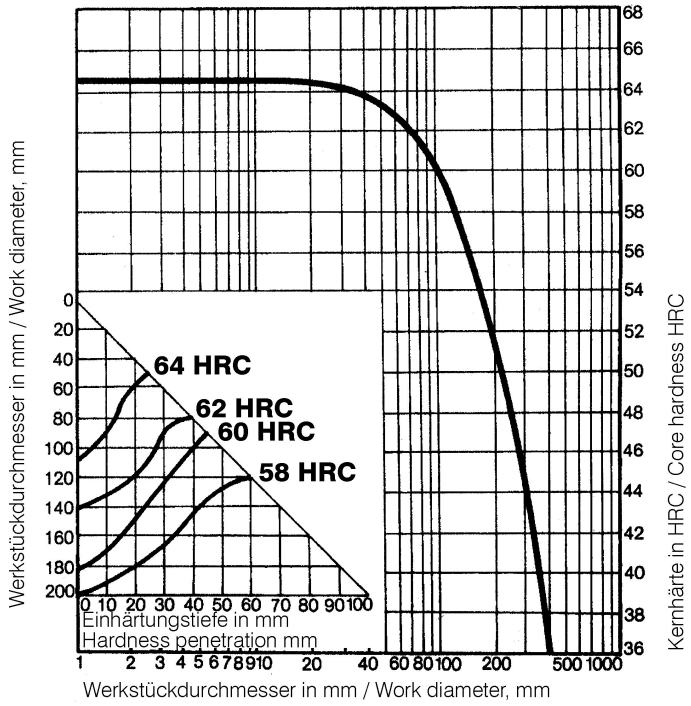


Isothermal TTT curves



Austenitising temperature: 1742°F (950°C)
Holding time: 30 minutes

Influence of work diameter on core hardness and hardness penetration



Hardening temperature: 1742°F (950°C)
Quenchant: Oil

Physical Properties

Temperature (°C | °F)	20 | 68
Density (kg/dm³ | lb/in³)	7.7 | 0.28
Thermal conductivity (W/(m.K) | BTU (IT) ft/hr/ft²/F)	20 | 11.56
Specific heat (J/(kg.K) | BTU (IT) lb/F)	460 | 109.87
Spec. electrical resistance (Ohm.mm²/m | 10⁻⁴ Ohm.inch²/ft)	0.65 | 3.07
Modulus of elasticity (10³N/mm² | 10³ksi)	210 | 30.46

Thermal Expansions

Temperature (°C | °F)	100 | 212	200 | 392	300 | 572	400 | 752	500 | 932	600 | 1112
Thermal expansion (10⁻⁶ m/(m.K) | 10⁻⁶ inch/(inch.F))	10.5 | 5.833	11 | 6.111	11 | 6.111	11.5 | 6.389	12 | 6.667	12 | 6.667

For more information see www.voestalpine.com/bohler-edelstahl

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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ONE STEP AHEAD.