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 K890 MICROCLEAN is a high-performance cold work tool steel manufactured using powder metallurgy. It features good toughness, very high compressive strength and excellent fatigue strength. This favorable combination of properties can avoid chipping damages to tools. BÖHLER K890 MICROCLEAN is not only used in cold work applications, but also in mold making.

Process Melting

Powder metallurgy

Properties

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

Applications

- Machine knife (for producers)
- Coining
- General Components for Mechanical Engineering
- Fine Blanking, Stamping, Blanking
- Rolling
- Powder Pressing
- Components for the recycling industry
- Cold Forming
- Wear parts
- Pill punching dies

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V	W	Co
0.85	0.55	0.40	4.35	2.80	2.10	2.55	4.50

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive	Wear resistance adhesive
BÖHLER K890 MICROCLEAN	★★★★	★★★★★	★★★★★	★★★	★★★
BÖHLER K100	★★	★★	★	★★★	★★
BÖHLER K105	★★	★★	★	★★	★★
BÖHLER K107	★★	★★	★	★★★	★★
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	★★★★	★★★★★	★★★★★	★★	★★

Delivery condition

Annealed

Hardness (HB)	max. 280

Heat treatment

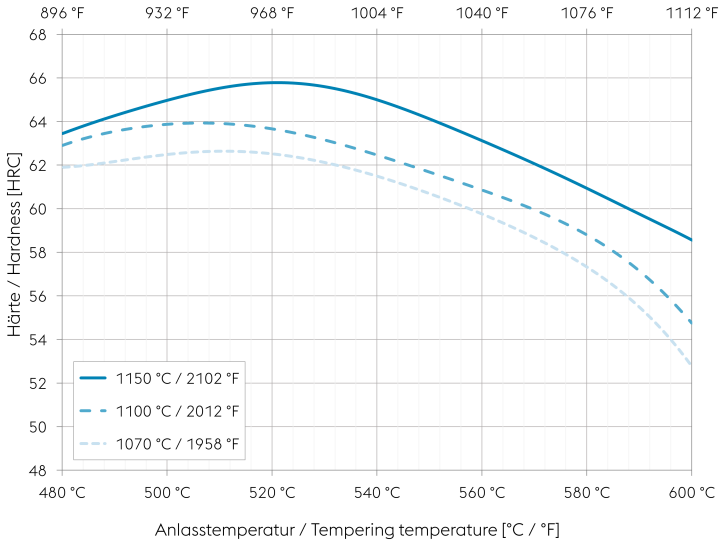
Stress relieving

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	1,070 to 1,150 °C	Quenching: Oil, gas (N_2) || Holding time after temperature equalization: 20-30 minutes (hardening temperature 1070 to 1100 °C | 1958 to 2012 °F) or 6 minutes (hardening temperature 1150 °C (2102 °F) || 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.

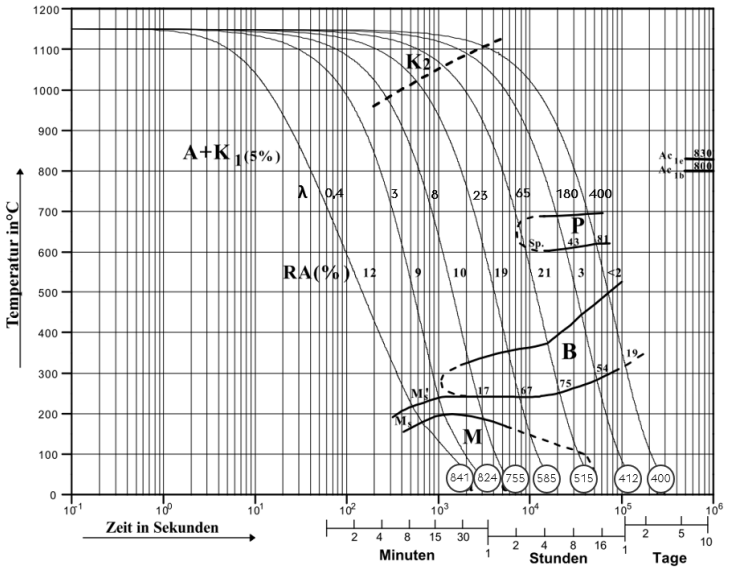
It is recommended to temper at least three times above the secondary hardness maximum.

Cooling in air to room temperature after each tempering step is recommended.

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

Recommended tempering temperature range is indicated by the grey area in the chart.

Continuous cooling CCT curves



Austenitising temperature: 1150 °C (2102 °F)
Holding time: 30 minutes

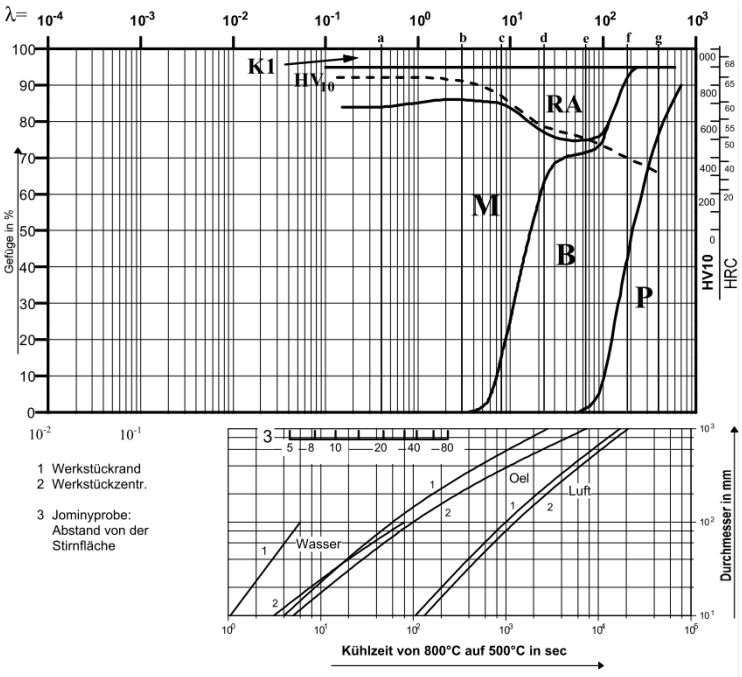
○ Vickers hardness

17...81 phase percentages

0.4...400 cooling parameter λ, i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in s x 10^{-2}

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

Quantitative phase diagram



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

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

Physical Properties

Temperature (°C)	**20**
Density (kg/dm³)	7.85
Thermal conductivity (W/(m.K))	22.5
Specific heat (kJ/kg K)	0.45
Spec. electrical resistance (Ohm.mm²/m)	0.5
Modulus of elasticity (10³N/mm²)	218

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

Temperature (°C)	**100**	**200**	**300**	**400**	**500**	**600**	**700**
Thermal expansion (10^{-6} m/(m.K))	10.5	11	11.3	11.7	12.1	12.4	12.9

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ONE STEP AHEAD.