BÖHLER

BÖHLER K890 MICROCLEAN®

COLD WORK STEELS

Available Product Variants

Long Products | Plates | Open Die Forgings

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
- Good toughness means safety against cracking of the molds in use : very high
- Uniformly high strength and toughness, even with large dimensions : very high
- Wear Resistance : good
- Compressive strength : high
- Dimensional stability : very high
- Excellent homogeneity and isotropy : very high
- Fine carbide structure : very high
- Homogeneous microstructure : very high

Applications

- Machine knife (for producers)
- Coining
- General Components for Mechanical Engineering
- Fine Blanking, Stamping, Blanking
- Rolling
- Powder Pressing
- Components for 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

voestalpine BÖHLER Edelstahl GmbH & Co KG
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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

Soft annealing

Temperature	650 to 700 °C | 1,202 to 1,292 °F	Depending on the application, hardness can be adjusted by using specialized annealing treatment.

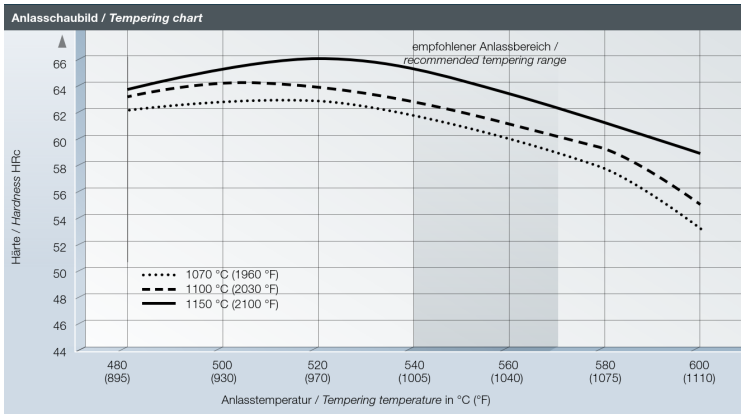
Stress relieving

Temperature	650 to 700 °C | 1,202 to 1,292 °F	After through-heating, soak for 1 to 2 hours in a neutral atmosphere. Slow cooling in furnace.

Hardening and Tempering

Temperature	1,070 to 1,150 °C | 1,958 to 2,102 °F	Following temperature equalisation: 20-30 minutes for a hardening temperature of 1070 - 1100 °C (1960 - 2010 °F) 6 minutes for a hardening temperature of 1150 °C (2100 °F) After hardening, tempering to the desired working hardness, see tempering chart.

Tempering chart



Tempering:

Hardening temperature:
• • • 1070°C/1960°F
- - - - - - 1100°C/2030°F
——— 1150°C/2100°F

Slow heating to tempering temperature immediately after hardening.

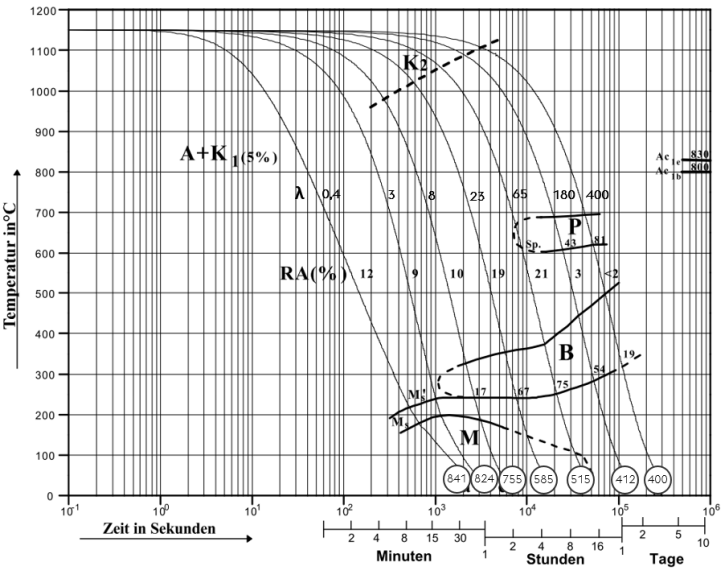
Dwell time in the oven 1 hour per 20 mm workpiece thickness, but at least 2 hours.

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

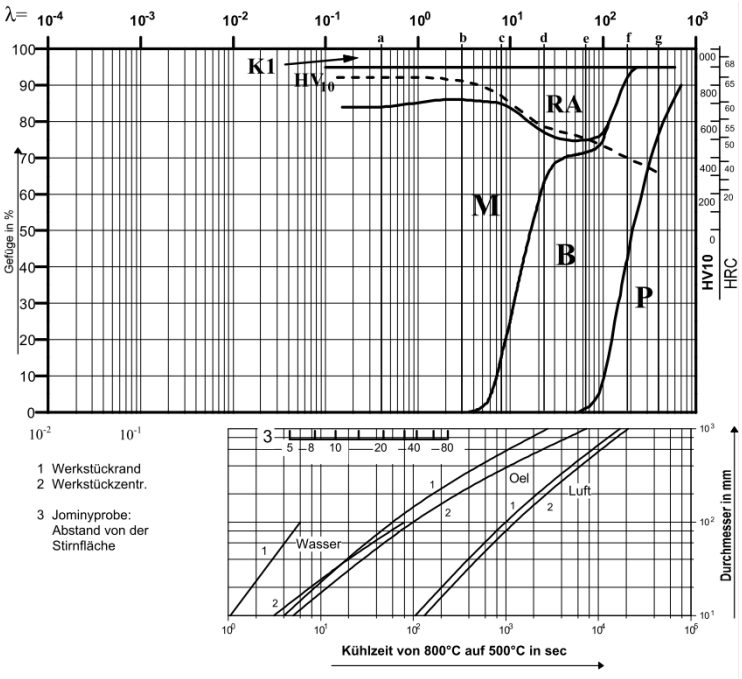
Tempering at 540-570 °C (1004-1058 (°F)) at least three times is recommended.

Please refer to the tempering diagram for guide values for the achievable hardness after tempering. Tempering for stress relieving 30 to 50°C below the highest tempering temperature.

Continuous cooling CCT curves



Quantitative phase diagram



Physical Properties

Temperature (°C | °F)	20 | 68
Density (kg/dm³ | lb/in³)	7.85 | 0.28
Thermal conductivity (W/(m.K) | BTU/ft h °F)	22.5 | 13
Specific heat (kJ/kg K | BTU/lb °F)	0.45 | 0.1075
Spec. electrical resistance (Ohm.mm²/m | 10⁻⁴ Ohm.inch²/ft)	0.5 | 2.36
Modulus of elasticity (10³N/mm² | 10³ksi)	218 | 31.56

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

Temperature (°C | °F)	100 | 212	200 | 392	300 | 572	400 | 752	500 | 932	600 | 1,112	700 | 1,292
Thermal expansion (10^{-6} m/(m.K) | 10^{-6} inch/inch.°F)	10.5 | 5.8	11 | 6.1	11.3 | 6.3	11.7 | 6.5	12.1 | 6.7	12.4 | 6.9	12.9 | 7.2

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