

# COLD WORK STEELS

## Available Product Variants

- Long Products
- Plates
- Open Die Forgings

## Product Description

Just as mountaineers need the best equipment to conquer the highest peaks, it's essential to use the best materials for your tooling to ensure trouble-free production and achieve outstanding tool life.

**Three reasons why BÖHLER K390 MICROCLEAN is highly cost effective:**

Extremely high wear resistance, excellent toughness and very high compressive strength. The high-performance powder-metallurgy steel BÖHLER K390 MICROCLEAN is a reliable solution for your difficult cutting, die-cutting and cold forming operations, and it has a very good track record for applications in the plastics industry.

## Process Melting

- Powder metallurgy

## Properties

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

## Applications

- > Machine knife (for producers)
- > Coining
- > Screws and Barrels
- > Rolls
- > Pill punching dies
- > Rolling
- > Fine Blanking, Stamping, Blanking
- > Thread rolling
- > Comps. for Equip. Below Ground (Boring, Shafts, etc.)
- > Cold Forming
- > Powder Pressing
- > General Components for Mechanical Engineering
- > Components for Recycling Industry

## Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V	W	Co
2.47	0.55	0.40	4.20	3.80	9.00	1.00	2.00

**Material characteristics**

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

**Delivery condition**

**Annealed**

Hardness (HB)	max. 280
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**Heat treatment**

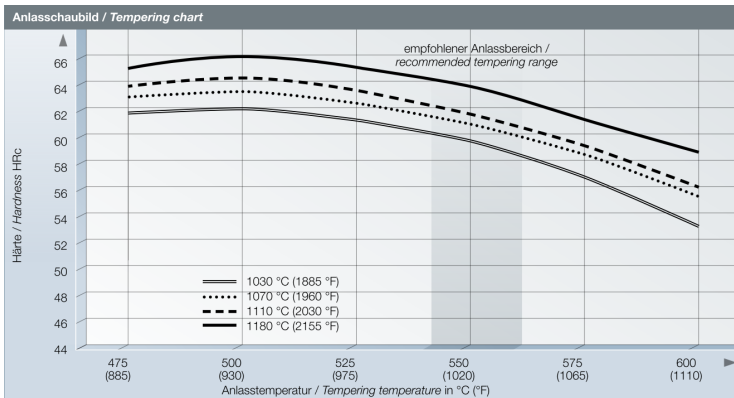
**Stress relieving**

Temperature	650 to 700 °C   1202 to 1292 °F	Once heated completely through, soak in neutral atmosphere at temperature for 1 to 2 hours. Slow cooling in furnace.
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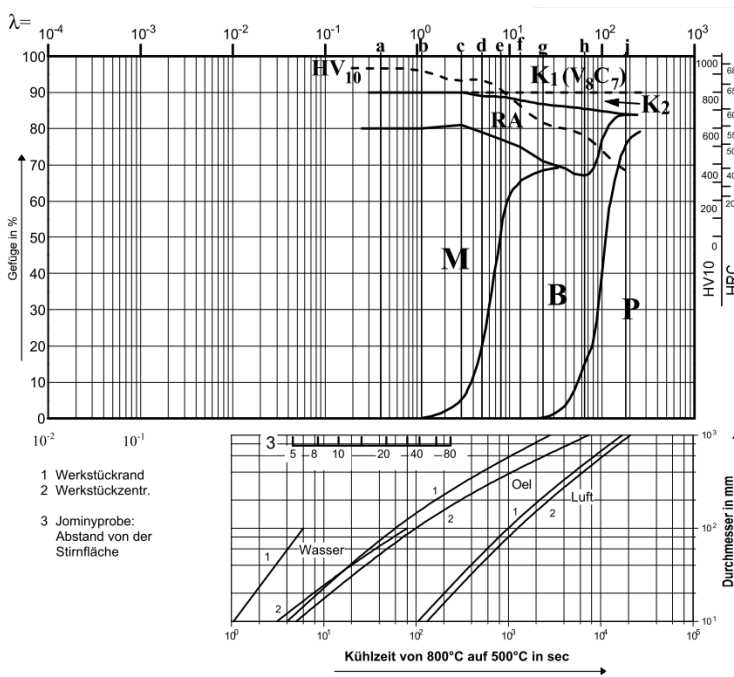
**Hardening and Tempering**

Temperature	1030 to 1180 °C   1886 to 2156 °F	Oil, N. Once heated completely through: • 20 - 30 min (hardening temperature 1030 - 1150 °C) • 10 min (hardening temperature 1180 °C) For high toughness, use a low hardening temperature. For high wear resistance, use a high hardening temperature. After hardening, tempering to the desired working hardness, see tempering chart.
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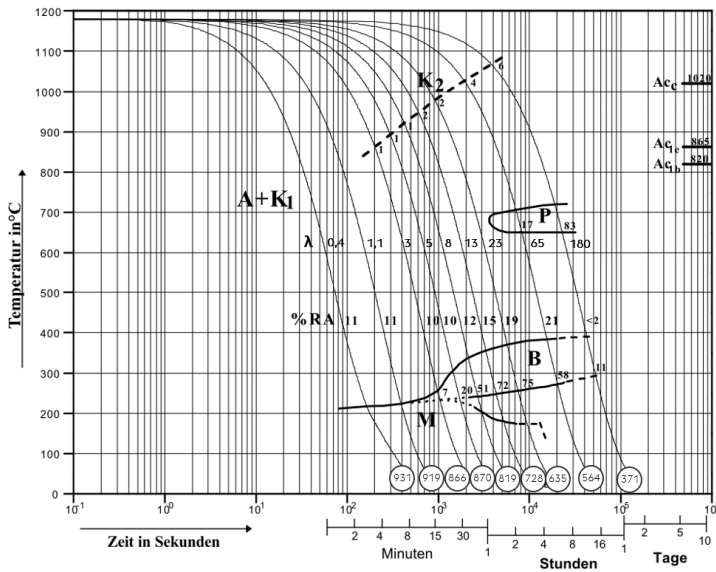
Tempering chart



Quantitative phase diagram



Continuous cooling CCT curves



Physical Properties

Temperature (°C   °F)	20   68
Density (kg/dm <sup>3</sup>   lb/in <sup>3</sup> )	7.6   0.27
Thermal conductivity (W/(m.K)   BTU (IT) ft/hr/ft <sup>2</sup> /F)	21.5   12.42
Specific heat (J/(kg.K)   BTU (IT) lb/F)	464   110.82
Spec. electrical resistance (Ohm.mm <sup>2</sup> /m   10 <sup>-4</sup> Ohm.inch <sup>2</sup> /ft)	0.59   2.79
Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup>   10 <sup>3</sup> ksi)	220   31.91

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

Temperature (°C   °F)	100   212	200   392	300   572	400   752	500   932	600   1112
Thermal expansion (10 <sup>-6</sup> m/(m.K)   10 <sup>-6</sup> inch/(inch.F))	10.3   5.7	10.67   5.9	11.03   6.1	11.38   6.3	11.7   6.5	11.97   6.6

For more information see <https://www.voestalpine.com/bohler-edelstahl/de/>

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.