

# COLD WORK STEELS

## Available Product Shapes

Flat Bar	Ground Flat	Long Products	Open Die Forgings	Plates
Round Bar	Round Ground Bar			

## Product Description

BÖHLER's cold work tool steel K490 MICROCLEAN closes the gap in the material demands between wear resistance and the desired high toughness.

## Properties

- High hardness (up to 64 HRC)
- Very good toughness
- High abrasive and adhesive wear resistance
- Excellent hard machinability
- High compressive strength
- Heat treatment together with common cold work tool steels (1.2379, D2) at hardening temperatures from 1030 to 1080 °C (1885 – 1980 °F) possible
- Stable mechanical properties

## Applications

- > Machine knife (for producers)
- > Coining
- > Screws and Barrels
- > Rolls
- > Rolling
- > Fine Blanking, Stamping, Blanking
- > Wear parts
- > Components for Recycling Industry
- > Cold Forming
- > Powder Pressing
- > General Components for Mechanical Engineering
- > Pill punching dies

## Chemical composition (wt. %)

C	Cr	Mo	V	W	Nb
1.4	6.4	1.5	3.7	3.5	+

### Material characteristics

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

### Delivery condition

Annealed	
Hardness	max. 280 HB

### Heat treatment

Stress relieving		
Temperature (°C   °F)	650   1202 to 700   1292	After through-heating, soak for 1 to 2 hours in a neutral atmosphere. Cool slowly in furnace.
Hardening and Tempering		
Temperature (°C   °F)	1030   1886 to 1080   1976	Oil, N. Following temperature equalisation: 20 - 30 minutes for a hardening temperature of 1030 - 1080 °C (1885 - 1980 °F). After hardening, tempering to the desired working hardness, see tempering chart.

## Physical Properties

<b>Temperature (°C   °F)</b>	<b>20   68</b>
Density (kg/dm <sup>3</sup>   lb/in <sup>3</sup> )	7.79   0.28
Thermal conductivity (W/(m.K)   BTU (IT) ft/hr/ft <sup>2</sup> /F)	19.6   11.32
Specific heat (J/(kg.K)   BTU (IT) lb/F)	450   107.48
Spec. electrical resistance (Ohm.mm <sup>2</sup> /m   10 <sup>-4</sup> Ohm.inch <sup>2</sup> /ft)	0.55   2.6
Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup>   10 <sup>3</sup> ksi)	223   32.34

## Thermal Expansions

Temperature (°C   °F)	100   212	200   392	300   572	400   752	500   932	600   1112	700   1292
Thermal expansion (10 <sup>-6</sup> m/(m.K)   10 <sup>-6</sup> inch/(inch.F))	10.6   5.889	11.1   6.167	11.6   6.444	11.9   6.611	12.3   6.833	12.6   7	12.8   7.111

For more information see [www.voestalpine.com/boehler-edelstahl](http://www.voestalpine.com/boehler-edelstahl)

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ONE STEP AHEAD.