

COLD WORK STEELS

Available Product Variants

Long Products*

Plates

*) Presented data refer exclusively to long products. Please observe the detailed explanations at the end of the data sheet (pdf).

Product Description

BÖHLER K390 MICROCLEAN is a high-alloyed, high-performance cold work tool steel manufactured using powder metallurgy. This material has the highest alloy content in the group of cold work tool steels with high vanadium content. The high alloy content gives this material outstanding wear resistance. At the same time, the powder metallurgical manufacturing process creates a uniform matrix with finely distributed primary carbides. Among other things, this leads to good material toughness. BÖHLER K390 MICROCLEAN is a problem solver for applications requiring extremely high wear resistance and compressive strength.

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.)
- > Glasfibre reinforced plastics
- > 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
BÖHLER K390 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 K490 MICROCLEAN®	★★★★	★★★★★	★★★★	★★★★	★★★★
BÖHLER K497 MICROCLEAN®	★★★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K888 MATRIX	★★★★	★★★★★	★★★★★	★★	★★
BÖHLER K890 MICROCLEAN®	★★★★	★★★★★	★★★★★	★★★	★★★

Delivery condition

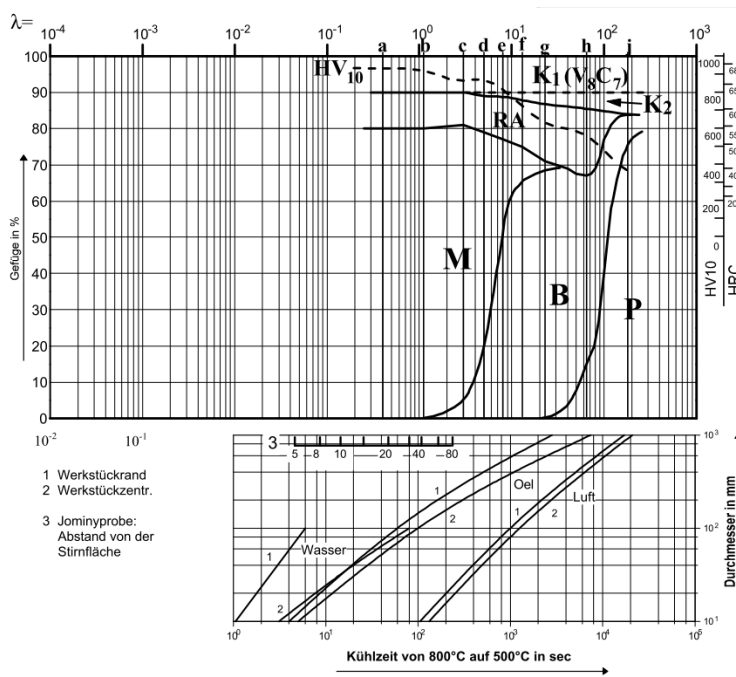
Annealed	
Hardness (HB)	max. 280

Heat treatment

Stress relieving		
Temperature	650 to 700 °C 1,202 to 1,292 °F	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	1,030 to 1,180 °C 1,886 to 2,156 °F	Quenching: Oil, gas (N ₂). Holding time after temperature equalization: 20 to 30 minutes (hardening temperature 1030 - 1150 °C 1886 - 2102 °F) and 10 min (hardening temperature 1180 °C 2156 °F) Low hardening temperature for high toughness. High hardening temperature for high wear resistance. After hardening, tempering to the desired working hardness according to the tempering chart.

Quantitative phase diagram



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

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

Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	7.6 0.27
Thermal conductivity (W/(m.K) BTU/ft h °F)	21.5 12.42
Specific heat (kJ/kg K BTU/lb °F)	0.464 0.1108
Spec. electrical resistance (Ohm.mm ² /m 10 ⁻⁴ Ohm.inch ² /ft)	0.59 2.79
Modulus of elasticity (10 ³ N/mm ² 10 ³ 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 1,112
Thermal expansion (10 ⁻⁶ m/(m.K) 10 ⁻⁶ 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

Long Products: For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

Sheet & Plates: Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact voestalpine BÖHLER Bleche GmbH & Co KG.

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.