

# 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 K340 ECOSTAR belongs to the group of conventionally produced 8% chromium steels. Compared to conventional 12% chromium steels, this conventionally smelted tool steel has better toughness, hardening response and higher adhesive wear resistance. This combination of high adhesive wear resistance and toughness also offers advantages for industrial knives subject to high stress. This grade is also used for stamping and cutting tools.

## Process Melting

Airmelted

## Properties

- > Compressive strength : good
- > Dimensional stability : good

## Applications

- > Machine knife (for producers)
- > Coining
- > Screws and Barrels
- > Thread rolling
- > Rolling
- > Fine Blanking, Stamping, Blanking
- > Wear parts
- > Cold Forming
- > Powder Pressing
- > General Components for Mechanical Engineering

## Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V	Others
1.10	0.70	0.40	8.20	2.10	0.50	+Al, Nb

**Material characteristics**

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive	Wear resistance adhesive
<b>BÖHLER K340</b> <b>ISODUR®</b>	★★★	★★★★	★★★	★★★	★★★★
<b>BÖHLER K340</b> <b>ECOSTAR®</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 K360</b> <b>ISODUR®</b>	★★★	★★★★	★★★	★★★★	★★★★
<b>BÖHLER K346</b>	★★★	★★★	★★★	★★★★	★★
<b>BÖHLER K353</b>	★★	★★★	★★	★★	★★
<b>BÖHLER K390</b> <b>MICROCLEAN®</b>	★★★★★	★★★★★	★★★★	★★★★★	★★★★★
<b>BÖHLER K490</b> <b>MICROCLEAN®</b>	★★★★	★★★★★	★★★★	★★★★	★★★★
<b>BÖHLER K497</b> <b>MICROCLEAN®</b>	★★★★★	★★★★★	★★★	★★★★★	★★★★★
<b>BÖHLER K888</b> <b>MATRIX</b>	★★★★	★★★★★	★★★★★	★★	★★
<b>BÖHLER K890</b> <b>MICROCLEAN®</b>	★★★★	★★★★★	★★★★★	★★★	★★★

**Delivery condition**

**Annealed**

Hardness (HB)	max. 235
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**Heat treatment**

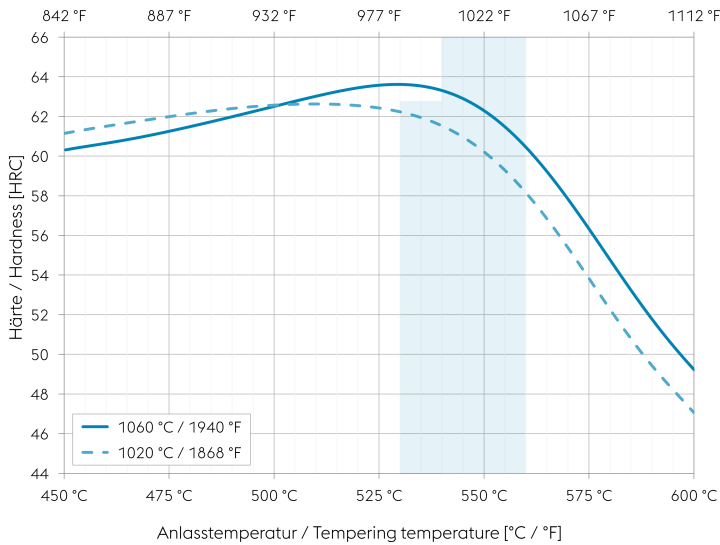
**Stress relieving**

Temperature	650 °C   1,202 °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.
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**Hardening and Tempering**

Temperature	1,020 to 1,060 °C   1,868 to 1,940 °F	Quenching: Oil, salt bath, compressed air, air, gas.    Holding time after temperature equalization: 15 to 30 minutes.    After hardening, tempering to the desired working hardness according to the tempering chart.
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**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.

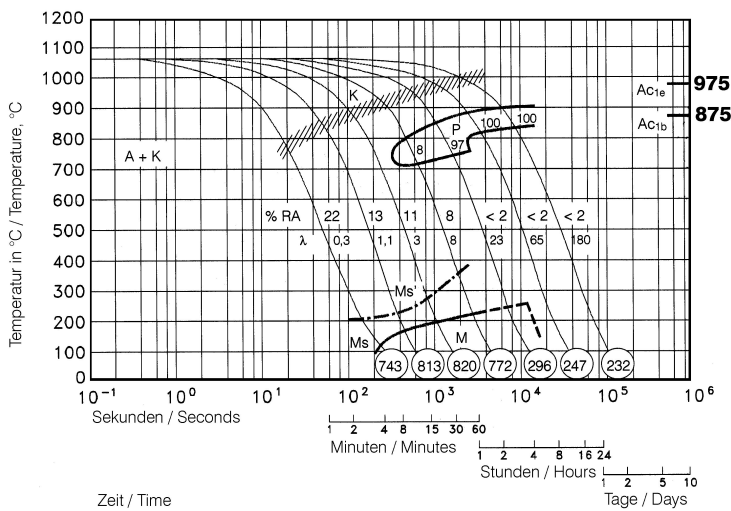
It is recommended to temper at least three times above the secondary hardness maximum.

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 blue area in the chart.

**Continuous cooling CCT curves**



Austenitising temperature: 1060 °C (1940 °F)  
Holding time: 30 minutes

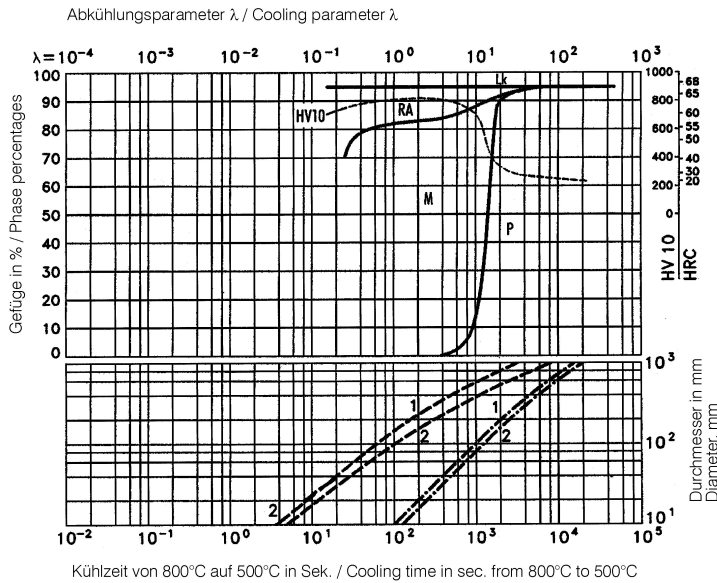
O Vickers hardness

8...100 phase percentages

0.3...180 cooling parameter  $\lambda$ , i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in  $s \times 10^{-2}$

- A... Austenite
- K... Carbide
- P... Pearlite
- RA... Residual austenite
- M... Martensite
- Ms... Martensite starting temperature

**Quantitative phase diagram**



HV10... Vickers Hardness  
LK... Ledeburitic carbides  
RA... Retained austenite  
M... Martensite  
P... Pearlite

--- Oil cooling  
- · - Air cooling

1... Edge or face  
2... Core

**Physical Properties**

Temperature (°C   °F)	20   68
Density (kg/dm <sup>3</sup>   lb/in <sup>3</sup> )	7.68   0.28
Thermal conductivity (W/(m.K)   BTU/ft h °F)	17.8   10.28
Specific heat (kJ/kg K   BTU/lb °F)	0.49   0.117
Spec. electrical resistance (Ohm.mm <sup>2</sup> /m   10 <sup>-4</sup> Ohm.inch <sup>2</sup> /ft)	0.64   3.02
Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup>   10 <sup>3</sup> ksi)	206   29.88

**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 <sup>-6</sup> m/(m.K)   10 <sup>-6</sup> inch/inch.°F)	11.2   6.2	11.8   6.6	12.3   6.8	12.7   7.1	12.9   7.2	13.1   7.3	13.1   7.3

**Long Products:** For additional specifications, technical requirements, and other dimensions, 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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**voestalpine**

ONE STEP AHEAD.