COLD WORK STEELS

Available Product Variants

Long Products

Product Description

BÖHLER K346 belongs to the group of conventionally produced 8% chromium steels. Its alloy composition features a high content of molybdenum, tungsten and vanadium, which makes BÖHLER K346 more wear resistant and tougher than conventional 12% chromium steels (1.2080, 1.2379). BÖHLER K346 is used in situations where materials like 1.2379 are insufficient in terms of toughness and where high requirements for abrasive wear resistance are set. This combination of high wear resistance and toughness offers advantages for industrial knives subject to high stress in the recycling industry. This grade is also used for stamping and cutting tools.

Process Melting

Airmelted

Properties

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

Applications

- Machine knife (for producers)
- Components for Recycling Industry
- Comps. for Equip. Below Ground (Boring, Shafts, etc.)
- Thread rolling

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V
1.13	1.20	0.35	7.80	1.60	2.40

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive	Wear resistance adhesive
BÖHLER K346	★★★	★★★	★★★	★★★★	★★
BÖHLER K100	★★	★★	★	★★★	★★
BÖHLER K105	★★	★★	★	★★	★★
BÖHLER K110	★★	★★★	★	★★★	★★
BÖHLER K190 MICROCLEAN	★★★★	★★★★★	★★★★	★★★★	★★★★
BÖHLER K294 MICROCLEAN	★★★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K340 ECOSTAR	★★★	★★★	★★	★★	★★
BÖHLER K340 ISODUR	★★★	★★★★	★★★	★★★	★★★★
BÖHLER K353	★★	★★★	★★	★★	★★
BÖHLER K360 ISODUR	★★★	★★★★	★★★	★★★★	★★★★
BÖHLER K390 MICROCLEAN	★★★★★	★★★★★	★★★★	★★★★★	★★★★★
BÖHLER K490 MICROCLEAN	★★★★	★★★★★	★★★★	★★★★	★★★★
BÖHLER K497 MICROCLEAN	★★★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER K888 MATRIX	★★★★	★★★★★	★★★★★	★★	★★
BÖHLER K890 MICROCLEAN	★★★★	★★★★★	★★★★★	★★★	★★★

Delivery condition

Annealed

Hardness (HB)	max. 250

Heat treatment

Annealing

Temperature	840 to 870 °C | 1,544 to 1,598 °F	Slow controlled cooling in furnace at a rate of 10 to 20 °C/hr (18 to 36 °F/hr) down to approximately 600 °C (1112 °F) || Further cooling in air.

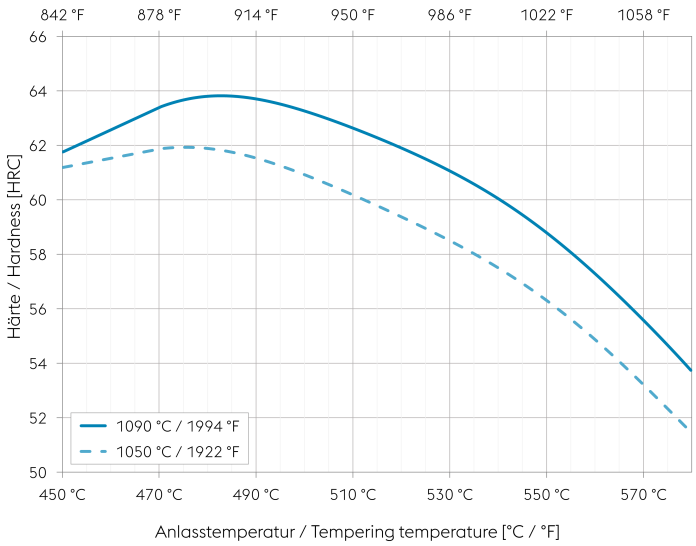
Stress relieving

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.

Hardening and Tempering

Temperature	1,050 to 1,090 °C | 1,922 to 1,994 °F	Quenching: Oil, gas, air. || Holding time after temperature equalization: 15 to 30 minutes. || After hardening, tempering to the desired working hardness according to the tempering chart.

Tempering Chart



Specimen profile: 7x10 mm (0,28x0,39 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.

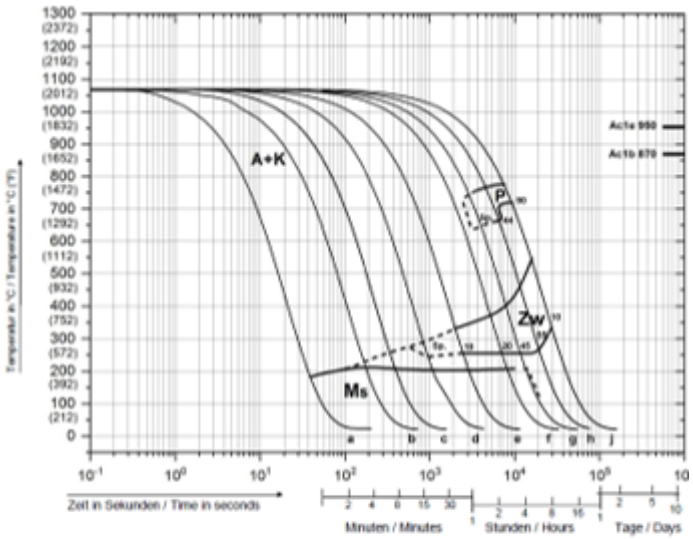
Please refer to the tempering chart for guide values for the achievable hardness after tempering.

It is recommended to temper at least three times at 540 °C (1004 °F) for 2 hours.

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.

Continuous cooling CCT curves



Austenitising temperature: 1070 °C (1958 °F)
Holding time: 30 minutes

10....90 phase percentages
Cooling parameter λ... duration of cooling from 800 to 500 °C (1472 to 932 °F) in s x 10^{-2}

A... Austenite
K... Carbide
P... Perlite
Zw... Bainite
Ms... Martensite starting temperature

Probe	(DIL805) Vers.Nr.	λ	HV_{10}	RA%	Probe	(DIL805) Vers.Nr.	λ	HV_{10}	RA%
a	2151	0,1	812	14	g	2154	38	610	7
b	2153	0,5	810	13	h	2180	65	370	1
c	2148	1,1	810	12	j	2183	110	260	<1
d	2156	3	790	16					
e	2182	8	750	14					
f	2158	23	680	13					

Physical Properties

Temperature (°C | °F)	20 | 68
Density (kg/dm^3 | lb/in^3)	7.64 | 0.28
Thermal conductivity (W/(m.K) | BTU/ft h °F)	22 | 12.71
Specific heat (kJ/kg K | BTU/lb °F)	0.47 | 0.1123
Spec. electrical resistance (Ohm.mm^2/m | 10^{-4} Ohm.inch^2/ft)	0.6 | 2.84
Modulus of elasticity (10^3N/mm^2 | 10^3ksi)	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	700 | 1,292
Thermal expansion (10^{-6} m/(m.K) | 10^{-6} inch/inch.°F)	11 | 6.1	11.5 | 6.4	12 | 6.7	12.4 | 6.9	12.7 | 7.1	13 | 7.2	13.2 | 7.3

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

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voestalpine
ONE STEP AHEAD.