COLD WORK TOOL STEELS

Application Segments

Cold Work

Available Product Variants

Long Products

Product Description

Dimensionally stable, ledeburitic 12% chromium steel with very good wear resistance and acceptable toughness.

Process Melting

Airmelted

Properties

- Wear Resistance : good
- Dimensional stability : good

Applications

- Cold Forming
- Fine Blanking, Stamping, Blanking
- Rolls
- Coining
- Screws and Barrels
- Components for the recycling industry
- Machine knife (for producers)
- Rolling
- Powder Pressing
- Components for underground construction (drilling, shafts, etc.)
- General Components for Mechanical Engineering
- Standard Parts (Molds, Plates, Pins, Punches)
- Wear parts
- Thread rolling

Technical data

Material designation	
~1.2379	SEL
~X153CrMoV12	EN
~D2	AISI
SKD 11	JIS

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V
1.50	0.25	0.45	12.00	1.00	0.35

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive	Wear resistance adhesive
BÖHLER K137	★★	★★★	★	★★★	★★
BÖHLER K100	★★	★★	★	★★★	★★
BÖHLER K340 ISODUR	★★★	★★★★	★★★	★★★	★★★★
BÖHLER K353	★★	★★★	★★	★★	★★
BÖHLER K360 ISODUR	★★★	★★★★	★★★	★★★★	★★★★
BÖHLER K390 MICROCLEAN	★★★★★	★★★★★	★★★★	★★★★★	★★★★★
BÖHLER K490 MICROCLEAN	★★★★	★★★★★	★★★★	★★★★	★★★★
BÖHLER K890 MICROCLEAN	★★★★	★★★★★	★★★★★	★★★	★★★

The evaluation of the characteristics refers only to the brands considered here. Cross-comparisons with other reviews are discouraged due to different framework conditions.

Delivery condition

Annealed

Hardness (HB)	max. 255

Heat treatment

Annealing

Temperature	800 to 850 °C	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.

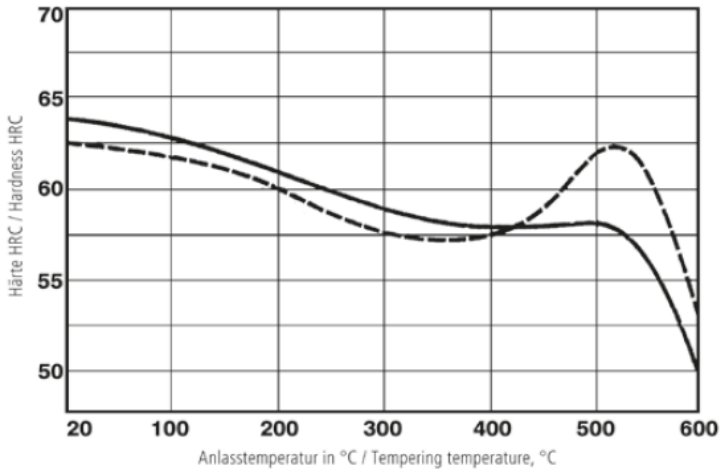
Stress relieving

Temperature	650 to 700 °C	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 °C	Quenching: Oil, salt bath (220 to 250 °C or 500 to 550 °C | 428 to 482 °F or 932 to 1022 °F), gas, compressed or still air. Tools of intricate shape or with sharp edges should preferably be hardened in 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



Tempering chart correspond to BÖHLER K110 (D2; 1.2379)

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.

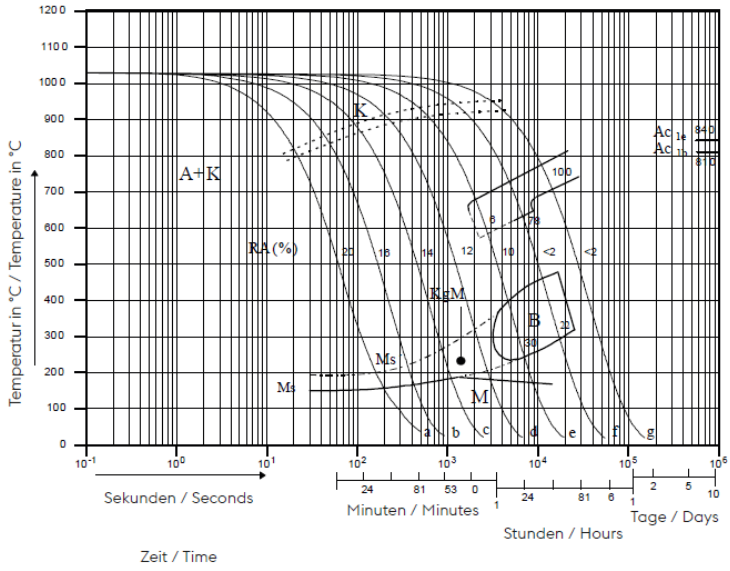
Tempering for stress relieving 30 to 50 °C (86 to 122 °F) below the highest tempering temperature.

Recommended tempering temperature range is indicated by the blue area in the chart.

Hardening temperature:

---- 1030 °C / 1886 °F
- - - - 1070 °C / 1958 °F

Continuous cooling CCT curves



Austenitising temperature: 1030 °C/1886 °F
Holding time: 30 minutes

A... Austenite
K... Carbide
P… Perlite
B…Bainite
M… Martensite
Ms… Martensite starting temperature

Physical Properties

Temperature (°C)	20
Density (kg/dm³)	7.67
Thermal conductivity (W/(m.K))	23.9
Specific heat (kJ/kg K)	0.47
Spec. electrical resistance (Ohm.mm²/m)	0.65
Modulus of elasticity (10³N/mm²)	200

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

Temperature (°C)	100	200	300	400	500	600	700
Thermal expansion (10^{-6} m/(m.K))	11	11.4	11.9	12.2	12.7	12.8	12.1

voestalpine BÖHLER Edelstahl GmbH & Co KG
Mariazeller Straße 25
8605 Kapfenberg, AT
T. +43/50304/20-0
E. info@bohler-edelstahl.at
https://www.voestalpine.com/bohler-edelstahl/de/

voestalpine
ONE STEP AHEAD.