

COLD WORK STEELS

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 Recycling Industry
- > Machine knife (for producers)
- > Rolling
- > Powder Pressing
- > Comps. for Equip. Below Ground (Boring, Shafts, etc.)
- > General Components for Mechanical Engineering
- > Standard Parts (Molds, Plates, Pins, Punches)
- > Wear parts
- > Thread rolling

Technical data

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

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.

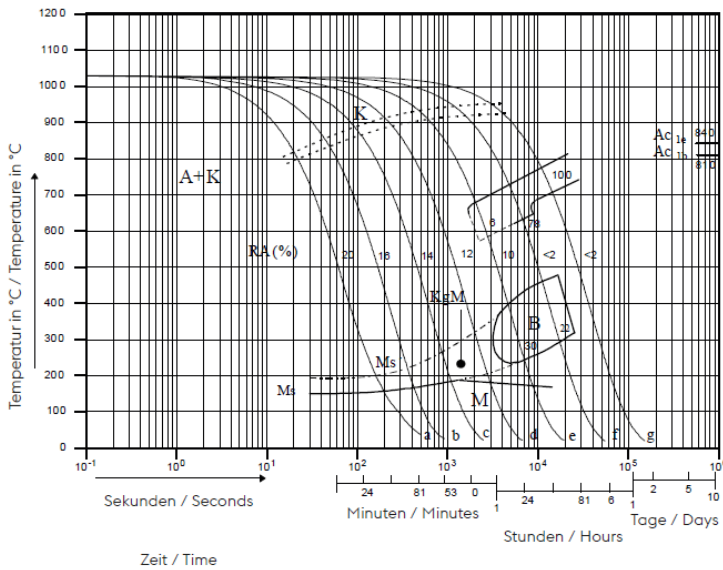
Delivery condition

Annealed

Heat treatment

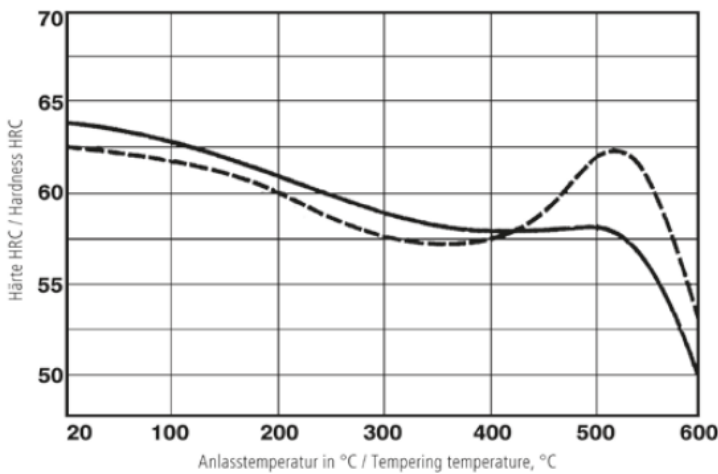
Annealing		
Temperature	800 to 850 °C 1,472 to 1,562 °F	Controlled slow oven cooling with 10 to 20°C/h (50 to 68°F/h) up to ca. 600°C/1112°F, further cooling in air. Supplied hardness max.: 255 HB
Stress relieving		
Temperature	650 to 700 °C 1,202 to 1,292 °F	Slow oven cooling. For stress relief after extensive machining or at complicated tools. Holding time after complete through heating 1 - 2 hours in neutral atmosphere.
Hardening and Tempering		
Temperature	1,030 °C 1,886 °F	Difficultly shaped tools in air, simply shaped tools in compressed air, oil, hot bath or gas. Holding time after complete soaking: 15 to 30 minutes. Achievable hardness: min. 58 HRC.

Continuous cooling CCT curves



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

Tempering chart



Tempering:

Slow heating to tempering temperature immediately after hardening/
time in furnace 1 hour for each 20 mm of workpiece thickness but at least 2 hours/cooling in air.
Please refer to the tempering chart for obtainable hardness after tempering.

Tempering after the secondary hardness maximum is recommended.

Hardening temperature:

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

Tempering chart correspond to BÖHLER K110 (D2; 1.2379)

Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	7.67 0.28
Thermal conductivity (W/(m.K) BTU/ft h °F)	23.9 13.81
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)	0.65 3.07
Modulus of elasticity (10 ³ N/mm ² 10 ³ ksi)	200 29.01

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	11.4 6.3	11.9 6.6	12.2 6.8	12.7 7.1	12.8 7.1	12.1 6.7

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.