BÖHLER

BÖHLER W300
ISOBLOC®

HOT WORK TOOL STEELS

Available Product Shapes

Long Products | Open Die Forgings | Plates

Product Description

Electro-slag remelted hot-work tool steel with very high toughness, good hot strength properties and good polishability.

Properties

- High toughness & ductility
- Good wear resistance
- Very good machinability
- Good hot hardness
- Very good polishability
- High thermal conductivity
- High micro-cleanliness
- Excellent homogeneity and isotropy
- Coatable
- Can be nitrated

Applications

- Extrusion
- General Components for Mechanical Engineering
- Injection Molding
- Rolling
- Fine Blanking, Stamping, Blanking
- Forging Applications
- Fasteners, Bolts, Nuts
- Gravity / Low Pressure Die-Casting
- Press Hardening / Hot Stamping
- Shearing / Machine Knives
- Standard Parts (Molds, Plates, Pins, Punches)
- Rolls
- Forging (Hot / Semi-hot)
- High Pressure Die-Casting
- Progressive Forging (Hatebur)
- Tool Holders (milling, drilling, turning & chucks)
- Screws and Barrels
- Hotrunner systems

Technical data

Material designation	
1.2343	SEL
X37CrMoV5-1	EN
T20811	UNS
H11	AISI
SKD6	JIS
D1830	NADCA

Standards	
4957	EN ISO
G4404	JIS
#207	NADCA

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V
0.38	0.9	0.4	5.2	1.3	0.45

voestalpine BÖHLER Edelstahl GmbH & Co KG
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ONE STEP AHEAD.

Material characteristics

	High temperature strength	High temperature toughness	High temperature wear resistance	Machinability
BÖHLER W300 ISOBLOC	★★	★★★★	★★	★★★★★
BÖHLER W300 ISODISC	★★	★★★	★★	★★★★★
BÖHLER W302 ISODISC	★★★	★★★	★★★	★★★★★
BÖHLER W302 ISOBLOC	★★★	★★★★	★★★	★★★★★
BÖHLER W303 ISODISC	★★★★	★★★	★★★★	★★★★★
BÖHLER W350 ISOBLOC	★★★	★★★★★	★★★	★★★★★
BÖHLER W360 ISOBLOC	★★★★★	★★★★	★★★★★	★★★★★
BÖHLER W400 VMR®	★★	★★★★★	★★	★★★★
BÖHLER W403 VMR®	★★★★	★★★★	★★★★	★★★★

Delivery condition

Annealed

Hardness	max. 205 HB

Hardened and Tempered

Hardness	40 to 55 HRC | bars hardened and tempered (BHT)

Hardened and Tempered

Hardness	30 to 50 HRC

Heat treatment

Annealing

Temperature (°C | °F)	750 | 1382 to 800 | 1472	Slow controlled cooling in furnace at a rate of 50 to 68°F/hr (10 to 20°C/hr) down to approx. 1112°F (600°C), further cooling in air.

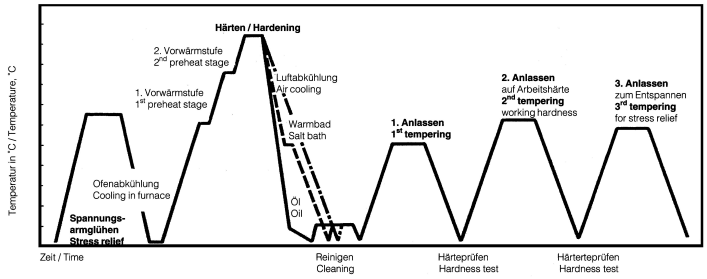
Stress relieving

Temperature (°C | °F)	600 | 1112 to 650 | 1202	Slow cooling in furnace. Intended to relieve stresses set up by extensive machining, or in complex shapes. After through heating, hold in neutral atmosphere for 1 - 2 hours.

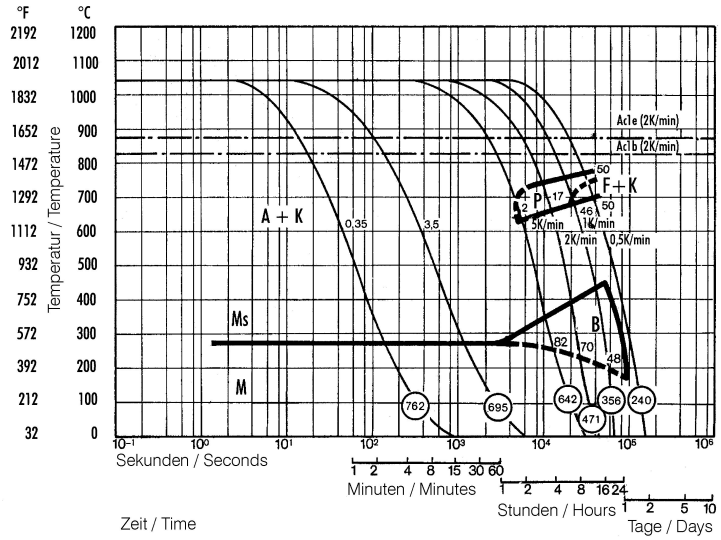
Hardening and Tempering

Temperature (°C | °F)	1000 | 1832 to 1030 | 1886	Oil, salt bath 932-1022°F (500 - 550°C), air, vacuum. Holding time after temperature equalization: 15 to 30 minutes. Die casting equipment: 1832 - 1850°F (1000 - 1010 °C) After hardening, tempering to the desired working hardness, see tempering chart.

Heat treatment sequence



Continuous cooling CCT curves

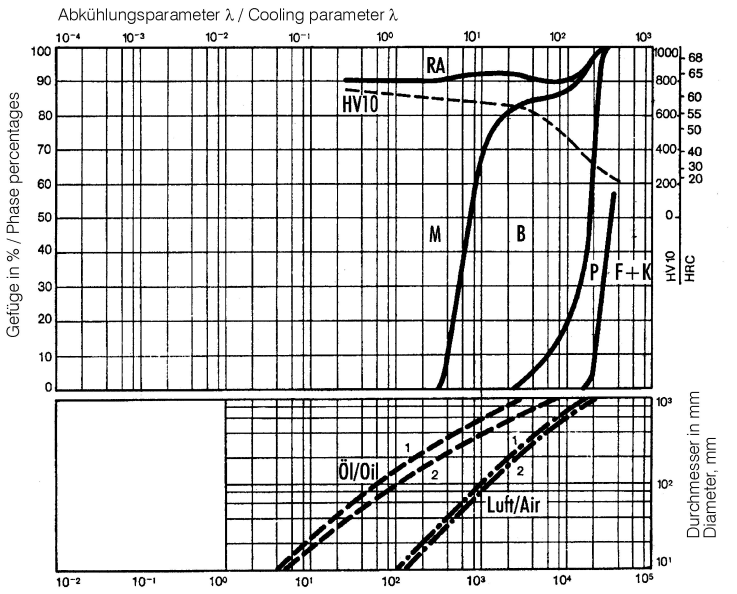


Numbers in circles = Vickers hardness

Austenitising temperature: 1030°C (1886°F)
Holding time: 15 minutes

O Vickers hardness
2...46 phase percentages
0.35...3.5 cooling parameter, i.e. duration of cooling from 800 - 500°C (1472-932°F) in s x 10^{-2}
5...0.5 K/min cooling rate in K/min in the 800 - 500°C (1472-932°F) range

Quantitative phase diagram

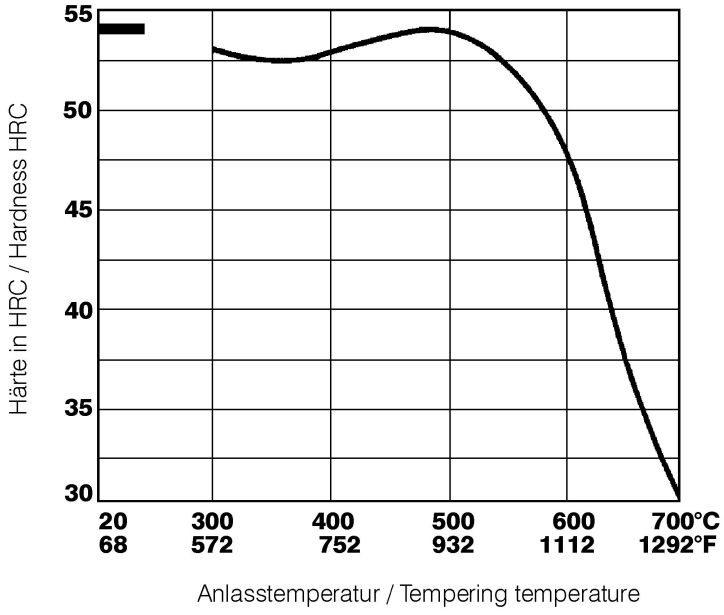


Kühlzeit von 800°C auf 500°C in Sek. / Time of cooling from 800°C to 500°C (1472-932°F) in seconds

A... Austenite
B... Bainite
F... Ferrite
K... Carbide
M... Martensite
P... Perlite
RA... Retained austenite

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

Tempering chart



Tempering:

Slow heating to tempering temperature immediately after hardening / time in furnace 1 hour for each 0,787 inch (20 mm) of workpiece thickness but at least 2 hours / cooling in air. It is recommended to temper at least twice. A third tempering cycle for the purpose of stress relieving may be advantageous.

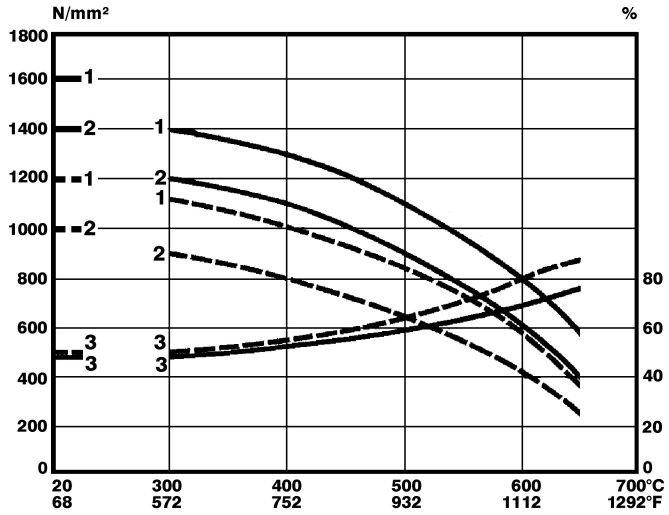
1st tempering approx. 86°F (30°C) above maximum secondary hardness.

2nd tempering to desired working hardness. The tempering chart shows average tempered hardness values.

3rd for stress relieving at a temperature 86 to 122°F (30 to 50°C) below highest tempering temperature.

Hardening temperature: 1020°C (1868°F)
Specimen size: square 50 mm

Hot strength chart



——— heat treated 1600 N/mm²
- - - - - - heat treated 1200 N/mm²
1... Tensile strength N/mm²
2... 0.2% proof stress N/mm²
3... Reduction of area %

Physical Properties

Temperature (°C | °F)	20 | 68
Density (kg/dm³ | lb/in³)	7.8 | 0.28
Thermal conductivity (W/(m.K) | BTU (IT) ft/hr/ft²/F)	24.9 | 14.39
Specific heat (J/(kg.K) | BTU (IT) lb/F)	460 | 109.87
Spec. electrical resistance (Ohm.mm²/m | 10⁻⁴ Ohm.inch²/ft)	-
Modulus of elasticity (10³N/mm² | 10³ksi)	211 | 30.65

Thermal Expansions

Temperature (°C | °F)	100 | 212	200 | 392	300 | 572	400 | 752	500 | 932	600 | 1112
Thermal expansion (10⁻⁶ m/(m.K) | 10⁻⁶ inch/(inch.F))	10.38 | 5.767	10.72 | 5.956	11.86 | 6.589	12.61 | 7.006	13.25 | 7.361	13.64 | 7.578

For more information see www.voestalpine.com/bohler-edelstahl

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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