

OȚELURI PENTRU SCULE PENTRU LUCRU LA CALD

Application Segments

Lucrări la cald

Available Product Variants

Long Products*

Plates

Open Die Forgings

* Datele prezentate se referă exclusiv la produsele lungi. Vă rugăm să respectați explicațiile detaliate de la sfârșitul fișei tehnice (pdf).

Product Description

BÖHLER W302 ISOBLOC is a 5% chromium steel and corresponds to material number 1.2344 (X40CrMoV5-1). Produced via the electroslag remelting process (ESR), this tool steel has very high hot toughness as well as very high hot hardness and a very good resistance against heat-checkings. The combination of these properties makes it a top performer in closed- and open-die forging as well as in high- and low-pressure die casting. In addition, this material has very good polishability and is therefore also often used as a molding material for plastic injection molds.

Process Melting

Topit în aer + refulat

Properties

- > Rezistență și ductilitate : high
- > Rezistență la uzură : high
- > Machinability : very high
- > Duritate la cald (duritate roșie) : high
- > Poluabilitate : very high
- > Conductivitate termică : good
- > Micro-curățenie : high

Applications

- > Turnare sub presiune înaltă
- > Forjare progresivă (Hatebur)
- > Turnare prin injecție
- > Cuțite industriale
- > Șuruburi și butoaie
- > Rulouri
- > Materiale plastice ranforsate cu fibră de sticlă
- > Mineral Processing
- > Pumps
- > Forjare (la cald / semi-cald)
- > Extrudare
- > Întărire prin presare / șampilare la cald
- > Suporturi de scule (frezare, găurire, strunjire și mandrine)
- > Turnare prin suflare
- > Inginerie mecanică
- > Grinding
- > Wear Applications
- > Roll Forming
- > Gravitate / presiune scăzută turnare sub presiune
- > Elemente de fixare, șuruburi, piulițe
- > Laminare
- > Piese standard (matrițe, plăci, pini, perforatoare)
- > Cuțit de mașină (pentru producători)
- > Sisteme Hotrunner
- > Drilling
- > Componente de injecție
- > Cold Rolling incl. Sendzimir Rolls

Technical data

Material designation		Standards	
1.2344	SEL	4957	EN ISO
X40CrMoV5-1	EN	#207	NADCA
T20813	UNS	G4404	JIS
H13	AISI		
B1885	NADCA		
SKD61	JIS		

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V
0.39	0.90	0.40	5.20	1.40	0.95

Material characteristics

	High temperature strength	High temperature toughness	High temperature wear resistance	Machinability in as supplied condition	Polishability
BÖHLER W302 ISOBLOC	★★★	★★★★	★★★	★★★★★	★★★★
BÖHLER W300 ISODISC	★★	★★★	★★	★★★★★	★★★
BÖHLER W300 ISOBLOC	★★	★★★★	★★	★★★★★	★★★★
BÖHLER W302 ISODISC	★★★	★★★	★★★	★★★★★	★★★
BÖHLER W303 ISODISC	★★★★	★★★	★★★★	★★★★★	★★★
BÖHLER W350 ISOBLOC	★★★	★★★★★	★★★	★★★★★	★★★★
BÖHLER W360 ISOBLOC	★★★★★	★★★★	★★★★★	★★★★★	★★★★
BÖHLER W400 VMR	★★	★★★★★	★★	★★★★	★★★★★
BÖHLER W403 VMR	★★★★	★★★★	★★★★	★★★★	★★★★★

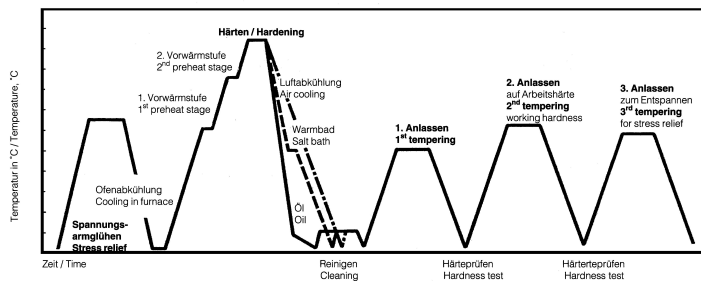
Delivery condition

Recoaptă	
Hardness (HB)	max. 229
Durificat și temperat	
Hardness (HRC)	40 to 55 bars hardened and tempered (BHT)
Durificat și temperat	
Hardness (HRC)	30 to 44

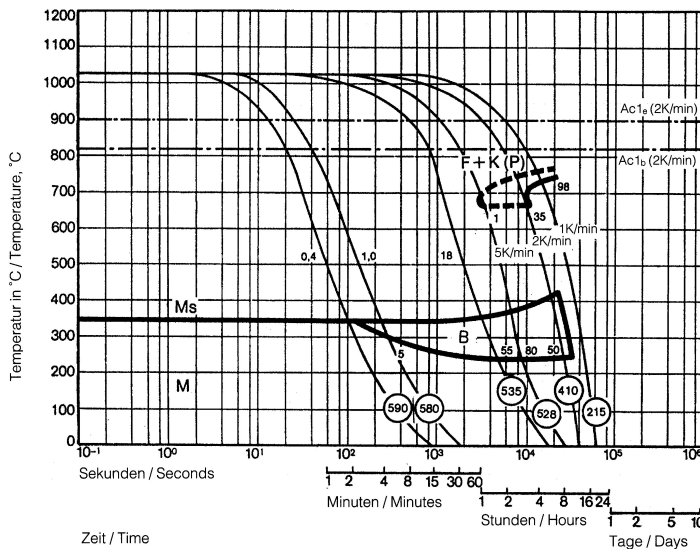
Heat treatment

Recoacere		
Temperature	750 to 800 °C	Holding time 6 to 8 hours. Slow, controlled furnace cooling at 10 to 20°C/h (50 to 68 °F/hr) to approx. 600°C (1112°F), further cooling in air.
Eliminarea stresului		
Temperature	600 to 670 °C	For stress relief after extensive machining or for complicated tools. Holding time depending on tool size after complete heating 2 - 6 hours in neutral atmosphere. Slow furnace cooling.
Călire și revenire		
Temperature	1,020 to 1,080 °C	(Die casting equipment: 1020 - 1030 °C [1868 - 1886°F]) Holding time after temperature equalization: 15 to 30 minutes; Quenching: Oil, salt bath (500 - 550°C [932-1022°F]), air, vacuum; After hardening, tempering to the desired working hardness (see tempering chart).

Heat treatment sequence



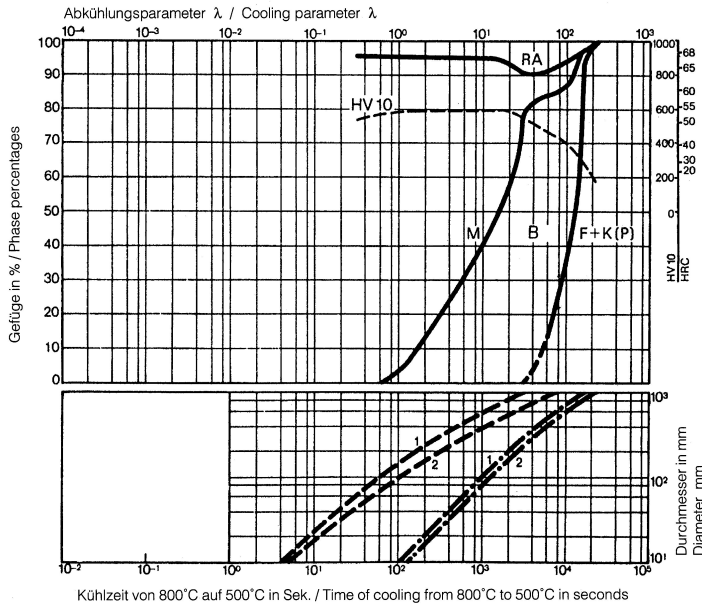
Continuous cooling CCT curves



Austenitising temperature: 1020°C (1868°F)
Holding time: 15 minutes

- Vickers hardness
- 1...35 phase percentages
- 0.4...18 cooling parameter, i.e. duration of cooling from 800 - 500°C (1472-932°F) in $s \times 10^{-2}$
- 5...1 K/min cooling rate in K/min in the 800 - 500°C (1472-932°F) range

Quantitative phase diagram

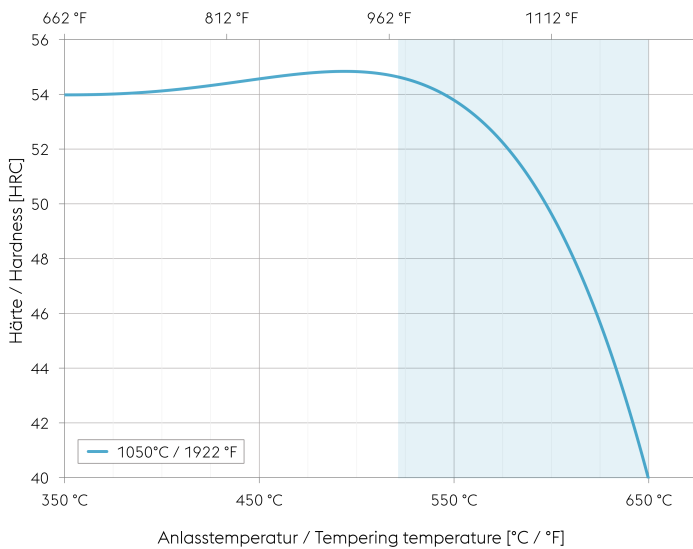


B... Bainite
F... Ferrite
K... Carbide
M... Martensite
P... Pearlite
RA... Retained austenite

----- Oil cooling
- · - Air cooling

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.

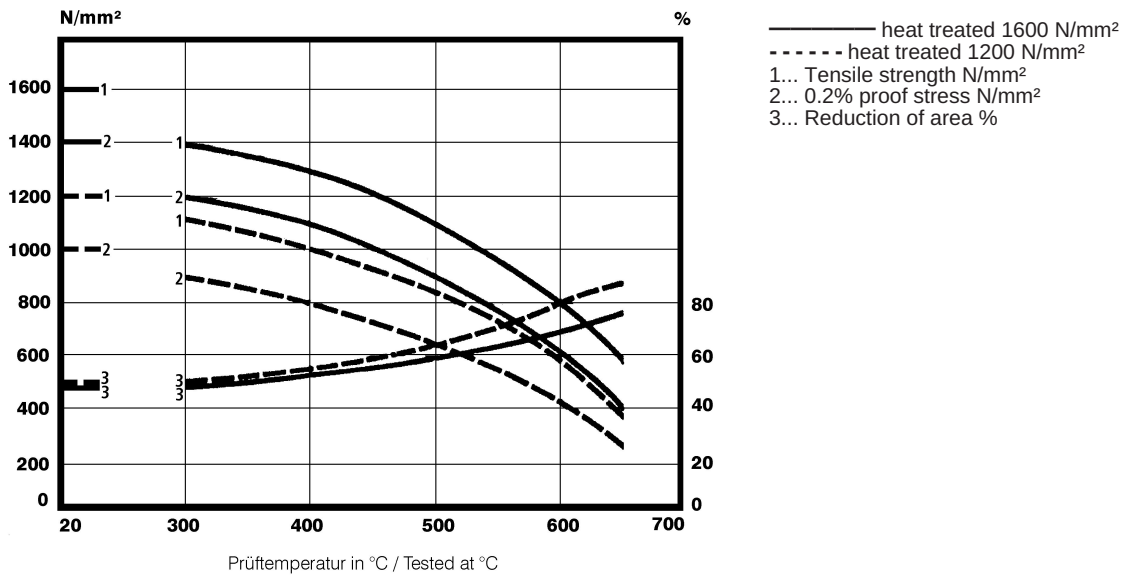
2nd tempering to desired working hardness. The tempering chart shows average tempered hardness values.

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

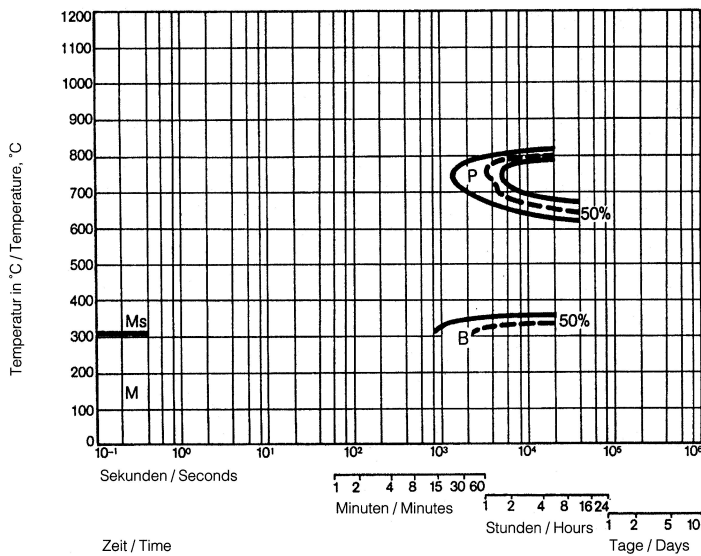
Recommended tempering temperature range is indicated by the blue area in the chart.

Hardening temperature: 1050°C (1922°F)
Specimen size: square 50 mm

Hot strength chart



Isothermal TTT curves



Austenitising temperature: 1020 °C (1868 °F)
Holding time: 15 minutes

Physical Properties

Temperature (°C)	20
Density (kg/dm ³)	7.8
Thermal conductivity (W/(m.K))	22.8
Specific heat (kJ/kg K)	0.47
Spec. electrical resistance (Ohm.mm ² /m)	0.52
Modulus of elasticity (10 ³ N/mm ²)	213

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

Temperature (°C)	100	200	300	400	500	600
Thermal expansion (10 ⁻⁶ m/(m.K))	10.8	11	12.1	12.7	14.2	14.3

If other available product variants are listed in addition to long products, please note that these may differ in terms of melting process, technical data, delivery and surface condition as well as available product dimensions. For mandatory technical specifications, other requirements and dimensions, please contact our regional voestalpine BÖHLER sales companies. 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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