

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 W360 ISOBLOC is a material produced by the electroslag remelting process (ESR), which has been specially adapted for use at high tool hardnesses in the range of 51-57 HRC. Although the steel can be classified as a 5% chromium steel, the increased carbon and molybdenum content coupled with state-of-the-art manufacturing technology ensures that BÖHLER W360 ISOBLOC still shows a very good toughness and an exceptionally good thermal resistance, even at high hardness levels. These properties make the steel the perfect choice for smaller components in the die casting sector (e.g., mold inserts, cores, core pins, ejector pins, etc.). The material also is frequently the preferred choice for closed-die and open-die forging tools due to its high wear resistance. Because of this excellent wear resistance and the high toughness, BÖHLER W360 ISOBLOC is also frequently used for cold work applications and as a molding material for plastic injection molds. The Steel also is available as powder material for metal-3D-printing under the brand name BÖHLER W360 AMPO.

Process Melting

Topit în aer + refulat

Properties

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

Applications

- | | | |
|---|---|--|
| > Turnare sub presiune înaltă | > Forjare (la cald / semi-cald) | > Forjare progresivă (Hatebur) |
| > Extrudare | > Blanking fin, ștanțare, blanking | > Montarea monedei |
| > Gravitate / presiune scăzută turnare sub presiune | > Turnare prin injecție | > Întărire prin presare / ștampilare la cald |
| > Laminare | > Cuțite industriale | > Inginerie mecanică |
| > Formare la rece | > Elemente de fixare, șuruburi, piulițe | > Aplicații de forjare |
| > Cuțit de mașină (pentru producători) | > Pulbere de presare | > Rulouri |
| > Șuruburi și butoaie | > Piese standard (matrite, plăci, pini, perforatoare) | > Matrite de perforare a pastilelor |
| > Materiale plastice ranforsate cu fibră de sticlă | > Cutting | > Grinding |
| > Extrusion | > Wear Applications | > Mineral Processing |

Applications

- > Drilling
 - > Gears
 - > Industria ambalajelor
- > Camshafts
 - > Roll Forming
- > Driveshafts
 - > Cold Rolling incl. Sendzimir Rolls

Technical data

Material designation	
BÖHLER patent	Market grade

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V
0.50	0.20	0.25	4.50	3.00	0.60

Material characteristics

	High temperature strength	High temperature toughness	High temperature wear resistance	Machinability in as supplied condition	Polishability
BÖHLER W360 ISOBLOC	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BÖHLER W300 ISOBLOC	★★	★★★★★	★★	★★★★★	★★★★★
BÖHLER W300 ISODISC	★★	★★★	★★	★★★★★	★★★
BÖHLER W302 ISOBLOC	★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER W302 ISODISC	★★★	★★★	★★★	★★★★★	★★★
BÖHLER W303 ISODISC	★★★★★	★★★	★★★★★	★★★★★	★★★
BÖHLER W320 ISODISC	★★★	★★	★★★	★★★★★	★★★
BÖHLER W350 ISOBLOC	★★★	★★★★★	★★★	★★★★★	★★★★★
BÖHLER W400 VMR	★★	★★★★★	★★	★★★★★	★★★★★
BÖHLER W403 VMR	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

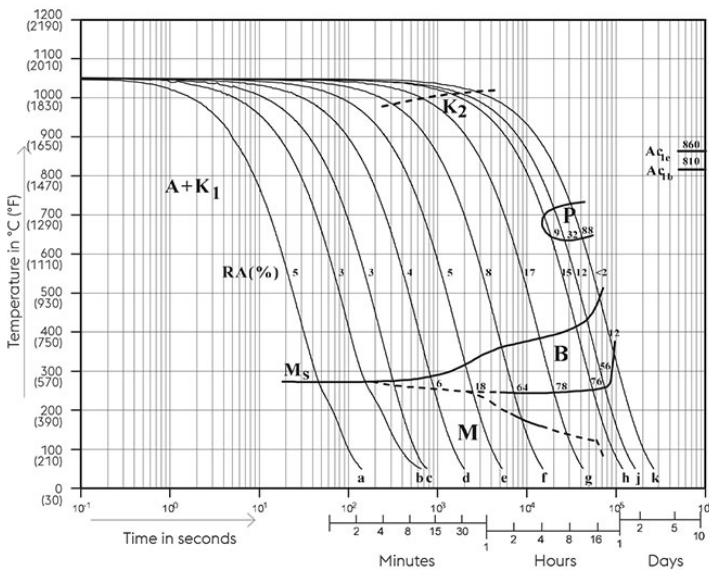
Delivery condition

Recoaptă	
Hardness (HB)	max. 205

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	650 to 700 °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	1,050 °C	Holding time after temperature equalization: 15 to 30 minutes; In order to prevent coarsening of the grain, hardening must be carried out at the recommended temperature; Quenching: oil, salt bath (500 - 550°C [930 to 1020 °F]), air, inert gas in vacuum; After hardening, required tempering treatment to achieve desired working hardness (see tempering chart).

Continuous cooling CCT curves

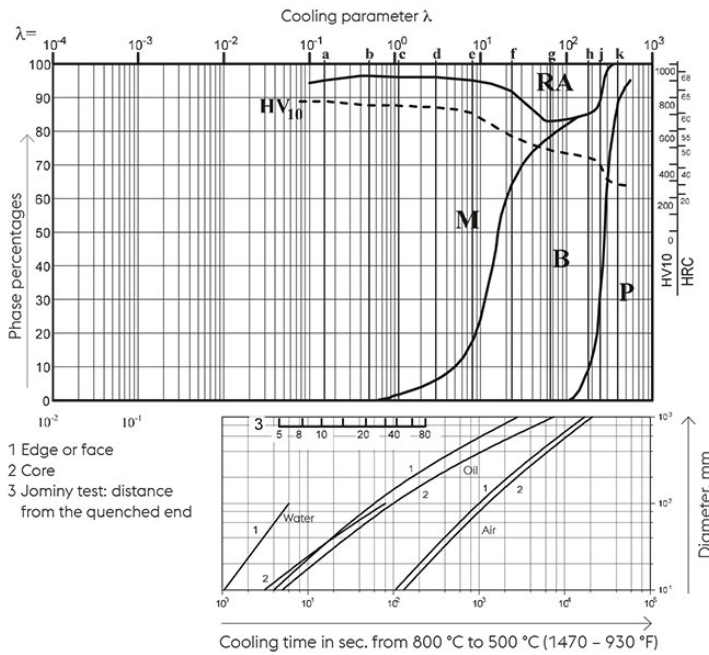


Austenitising temperature: 1050°C (1922°F)
Holding time: 30 minutes
5...100 phase percentages
0.5...400 cooling parameter, i.e. duration of cooling from 800 - 500°C (1472-932°F) in s x 10⁻²

Table:

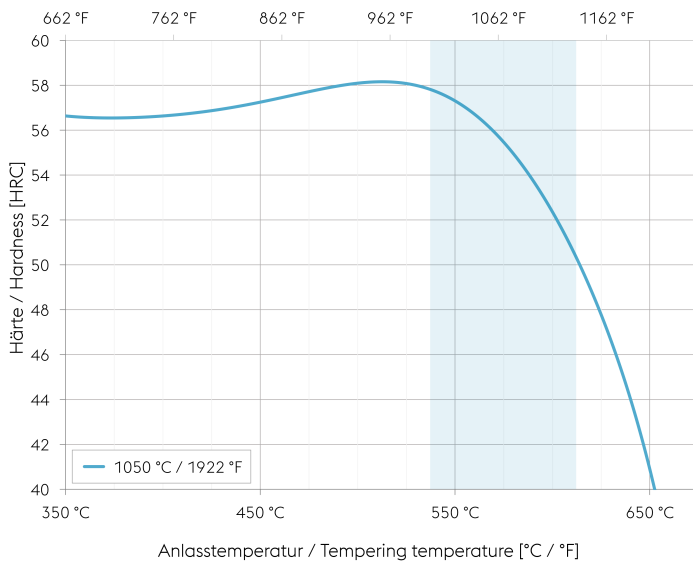
Sample	λ	HV10	Sample	λ	HV10
a	0,15	785	f	23	582
b	0,50	760	g	65	498
c	1,10	762	h	180	453
d	3	754	j	250	415
e	8	724	k	400	294

Quantitative phase diagram



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

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

Physical Properties

Temperature (°C)	20
Density (kg/dm ³)	7.8
Thermal conductivity (W/(m.K))	30.8
Specific heat (kJ/kg K)	0.43
Spec. electrical resistance (Ohm.mm ² /m)	-
Modulus of elasticity (10 ³ N/mm ²)	212

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	11.6	12.1	12.5	12.8	13.3

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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