BÖHLER

BÖHLER W360
ISOBLOC®

# HOT WORK TOOL STEELS

## Available Product Shapes

| | | | | |
|---|---|---|---|---|
| Flat Bar | Ground Flat | Long Products | Open Die Forgings | Plates |
| Round Bar | Round Ground Bar | | | |

## Product Description

Hot work tool steel with high hardness, specially developed for use in warm forging applications or for forging dies.
BÖHLER W360 ISOBLOC has a significantly higher toughness than 1.2367 ESR – at a higher hardness.

## Properties

- High toughness & ductility
- Very high wear resistance
- Very good machinability
- Very high hot hardness
- Very good polishability
- Very high thermal conductivity
- High micro-cleanliness
- High resistance to fire cracking
- Excellent homogeneity and isotropy
- Coatable
- Lowest levels of unwanted trace elements
- Can be nitrated
- Very high thermal stability

## Applications

- Coining
- Forging (Hot / Semi-hot)
- High Pressure Die-Casting
- Progressive Forging (Hatebur)
- Mechanical Engineering / Machine Building General
- Fasteners, Bolts, Nuts
- Powder Pressing
- Standard Parts (Molds, Plates, Pins, Punches)
- Extrusion
- General Components for Mechanical Engineering
- Injection Molding
- Rolling
- Automotive Racing
- Forging Applications
- Rolls
- Pill punching dies
- Fine Blanking, Stamping, Blanking
- Gravity / Low Pressure Die-Casting
- Press Hardening / Hot Stamping
- Shearing / Machine Knives
- Cold Forming
- Machine knife (for producers)
- Screws and Barrels

## Technical data

| Material designation | |
|---|---|
| BÖHLER patent | Market grade |

## Chemical composition (wt. %)

| C | Si | Mn | Cr | Mo | V |
|---|---|---|---|---|---|
| 0.5 | 0.2 | 0.25 | 4.5 | 3 | 0.6 |

**voestalpine BÖHLER Edelstahl GmbH & Co KG**
www.voestalpine.com/bohler-edelstahl

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ONE STEP AHEAD.

## Material characteristics

| | High temperature strength | High temperature toughness | High temperature wear resistance | Machinability |
|---|---|---|---|---|
| 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

### Annealed

| | |
|---|---|
| Hardness | max. 205 HB |

## Heat treatment

### Annealing

| | | |
|---|---|---|
| Temperature (°C \| °F) | 750 \| 1382 to 800 \| 1472 | Holding time 6 to 8 hours. Slow, controlled cooling in furnace at a rate of 10 to 20 °C/h (50 to 68 °F/h) down to approx. 600 °C (1100°F), further cooling in air. |

### Stress relieving

| | | |
|---|---|---|
| Temperature (°C \| °F) | 650 \| 1202 to 700 \| 1292 | After through-heating, soak for 1 to 2 hours in a neutral atmosphere. Cool slowly in furnace. |

### Hardening and Tempering

| | | |
|---|---|---|
| Temperature (°C \| °F) | 1050 \| 1922 | 1050 °C (1920 °F)/oil, salt bath 500 bis 550 °C (930 to 1020 °F), air, vacuum furnace with gas quenching Holding time after through-heating: 15 to 30 minutes After hardening, tempering to the desired working hardness, see tempering chart. |

## Physical Properties

| Temperature (°C \| °F) | 20 \| 68 |
|---|---|
| Density (kg/dm$^3$ \| lb/in$^3$) | 7.81 \| 0.28 |
| Thermal conductivity (W/(m.K) \| BTU (IT) ft/hr/ft$^2$/F) | 30.8 \| 17.8 |
| Specific heat (J/(kg.K) \| BTU (IT) lb/F) | 430 \| 102.7 |
| Spec. electrical resistance (Ohm.mm$^2$/m \| 10$^{-4}$ Ohm.inch$^2$/ft) | - |
| Modulus of elasticity (10$^3$N/mm$^2$ \| 10$^3$ksi) | 212 \| 30.8 |

## 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)) | 10.75 \| 5.972 | 11.56 \| 6.422 | 12.11 \| 6.728 | 12.5 \| 6.944 | 12.81 \| 7.117 | 13.28 \| 7.378 |

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



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