

HOT WORK TOOL STEELS

Available Product Shapes

Long Products	Open Die Forgings	Plates
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Product Description

A balanced alloy composition ensuring high toughness even in large tools and an improved thermal stability opts for an optimal hardness/strength-toughness/ductility ratio (elongation after fracture and percentage reduction of area after fracture) tailor-fit to every application.

Properties

- Very high toughness & ductility
- High wear resistance
- Very good machinability
- 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

- > Extrusion
- > Gravity / Low Pressure Die-Casting
- > Press Hardening / Hot Stamping
- > Forging (Hot / Semi-hot)
- > High Pressure Die-Casting
- > Progressive Forging (Hatebur)
- > General Components for Mechanical Engineering
- > Injection Molding
- > Mechanical Engineering / Machine Building General

Technical data

Material designation		Standards	
BÖHLER patent	Market grade	#207	NADCA
E1850	NADCA		

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V	N
0.38	0.2	0.55	5	1.8	0.55	def.

Material characteristics

	High temperature strength	High temperature toughness	High temperature wear resistance	Machinability
BÖHLER W350 ISOBLOC ®	★★★	★★★★★	★★★	★★★★★
BÖHLER W300 ISOBLOC ®	★★	★★★★	★★	★★★★★
BÖHLER W300 ISODISC ®	★★	★★★	★★	★★★★★
BÖHLER W302 ISOBLOC ®	★★★	★★★★	★★★	★★★★★
BÖHLER W302 ISODISC ®	★★★	★★★	★★★	★★★★★
BÖHLER W303 ISODISC ®	★★★★★	★★★	★★★★★	★★★★★
BÖHLER W320 ISODISC ®	★★★	★★	★★★	★★★★★
BÖHLER W360 ISOBLOC ®	★★★★★	★★★★	★★★★★	★★★★★
BÖHLER W400 VMR ®	★★	★★★★★	★★	★★★★
BÖHLER W403 VMR ®	★★★★★	★★★★	★★★★	★★★★

Delivery condition

Annealed	
Hardness	max. 205 HB

Heat treatment

Annealing		
Temperature (°C °F)	800 1472 to 850 1562	Slow controlled cooling in furnace at a rate of 10 to 20 °C/hr (50 to 68 °F/hr) down to approx. 600 °C (112 °F), further cooling in air.
Stress relieving		
Temperature (°C °F)	600 1112 to 650 1202	Slow cooling furnace. To relieve stresses caused by extensive machining, or for complex shapes. Soak for 1 -2 hours after temperature equalisation (in neutral atmosphere).
Hardening and Tempering		
Temperature (°C °F)	1010 1850 to 1020 1868	Oil, hot quenching (500 - 550 °C [932 - 1022 °F]), air or vacuum with gas quenching. 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. For big dimensions it's recommended to reduce the temperature to 1010 °C (1850 °F). 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)	7.8 0.28
Thermal conductivity (W/(m.K) BTU (IT) ft/hr/ft ² /F)	28.8 16.64
Specific heat (J/(kg.K) BTU (IT) lb/F)	460 109.87
Spec. electrical resistance (Ohm.mm ² /m 10 ⁻⁴ Ohm.inch ² /ft)	-
Modulus of elasticity (10 ³ N/mm ² 10 ³ ksi)	22 3.12

Thermal Expansions

Temperature (°C °F)	100 212	200 392	300 572	400 752	500 932	600 1112	700 1292
Thermal expansion (10 ⁻⁶ m/(m.K) 10 ⁻⁶ inch/(inch.F))	11.14 6.189	11.94 6.633	12.42 6.9	12.85 7.139	13.21 7.339	13.51 7.506	13.58 7.544

For more information see www.voestalpine.com/boehler-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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ONE STEP AHEAD.