

HOT WORK TOOL STEELS

Available Product Variants

- Long Products
- Plates
- Open Die Forgings

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

- > Toughness & Ductility: very high
- > Wear Resistance: high
- > Machinability: very high
- > Hot Hardness (red hardness): high
- > Polishability: very high
- > Thermal conductivity: very high
- > Micro-cleanliness: high

Applications

- > Extrusion
- > Forging (Hot / Semi-hot)
- > General Components for Mechanical Engineering
- > Gravity / Low Pressure Die-Casting
- > High Pressure Die-Casting
- > Injection Molding
- > Press Hardening / Hot Stamping
- > Progressive Forging (Hatebur)
- > 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 <https://www.voestalpine.com/boehler-edelstahl/de/>

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