

HOT WORK TOOL STEELS

Available Product Variants

Long Products*

Open Die Forgings

*) Presented data refer exclusively to long products. Please observe the detailed explanations at the end of the data sheet (pdf).

Product Description

BÖHLER W720 VMR is not a classic hot work tool steel, but an ultra-high strength maraging steel. Compared to quenched and tempered steels, the material generates its high strength not through a hardened and tempered martensitic structure with a high carbon content and secondary hardening carbides, but through the precipitation of intermetallic phases from a tough nickel martensitic matrix. BÖHLER W720 VMR corresponds to material number 1.6358 (X2NiCoMoTi18-9-5) and has proven to be ideally suited for many tool steel applications in cold and hot work (e.g., for extrusion stems) up to 450 °C.

Process Melting

VIM + VAR

Applications

- > Extrusion
 - > Injection Molding
- > Fasteners, Bolts, Nuts
 - > General Components for Mechanical Engineering
- > High Pressure Die-Casting

Technical data

Material designation	
1.6358	SEL
K93120	UNS

Chemical composition (wt. %)

C	Si	Mn	Mo	Ni	Co	Ti	Al
≤ 0,030	≤ 0,10	≤ 0,10	5.00	18.50	9.00	0.70	0.10

Delivery condition

Solution annealed

Hardness (HB) | max. 353

Solution annealed + precipitation hardened

Ultimate tensile strength (UTS) (MPa) | min. 1900

Heat treatment

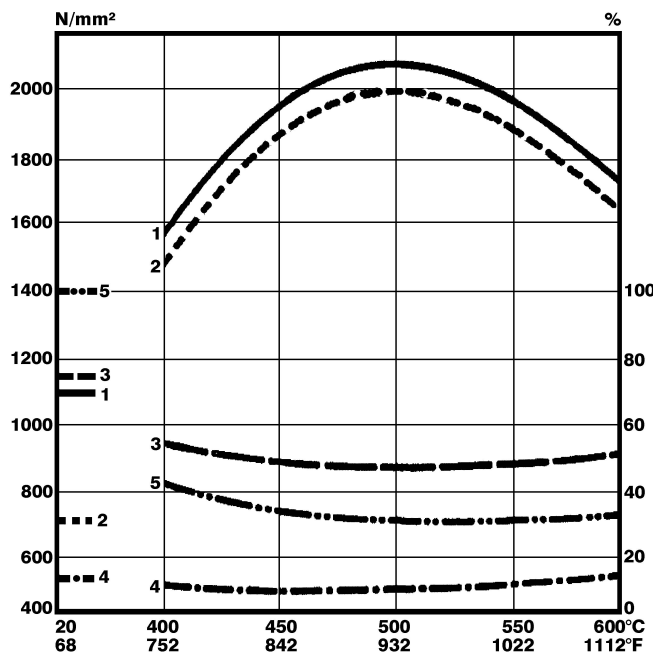
Solution annealing

Temperature	820 °C 1,508 °F	1 hour air, gas
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Precipitation hardening

Temperature	430 °C 806 °F	3 hours / air 1720 to 1870 N/mm ²
Temperature	480 °C 896 °F	3 hours / air 1860 to 2260 N/mm ²

Ageing chart



- 1... Tensile strength N/mm²
- 2... 0.2% proof stress N/mm²
- 3... Reduction of area %
- 4... Elongation A₅, %
- 5... Impact strength (DVM), J

Auslagerungstemperatur (Haltezeit 3 Stunden)
Ageing temperature (holding time 3 hours)

Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	8.2 0.3
Thermal conductivity (W/(m.K) BTU/ft h °F)	14 8.09
Specific heat (kJ/kg K BTU/lb °F)	0.46 0.1099
Spec. electrical resistance (Ohm.mm ² /m 10 ⁻⁴ Ohm.inch ² /ft)	0.4 1.89
Modulus of elasticity (10 ³ N/mm ² 10 ³ ksi)	193 27.99

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

Temperature (°C °F)	100 212	200 392	300 572	400 752	500 932	600 1,112
Thermal expansion (10^{-6} m/(m.K) 10^{-6} inch/inch. °F)	10.2 5.7	10.8 6	11 6.1	11.4 6.3	11.8 6.6	11.8 6.6

Long Products: For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

Open Die Forgings: Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact the business unit Open Die Forgings of voestalpine BÖHLER Edelstahl GmbH & Co KG.

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.