

HOT WORK TOOL STEELS

Application Segments

Hot Work

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

- > Hot Extrusion
 - > Injection Moulding
- > Fasteners, Bolts, Nuts
 - > Driveshafts
- > High Pressure Die-Casting
 - > Mechanical Engineering

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

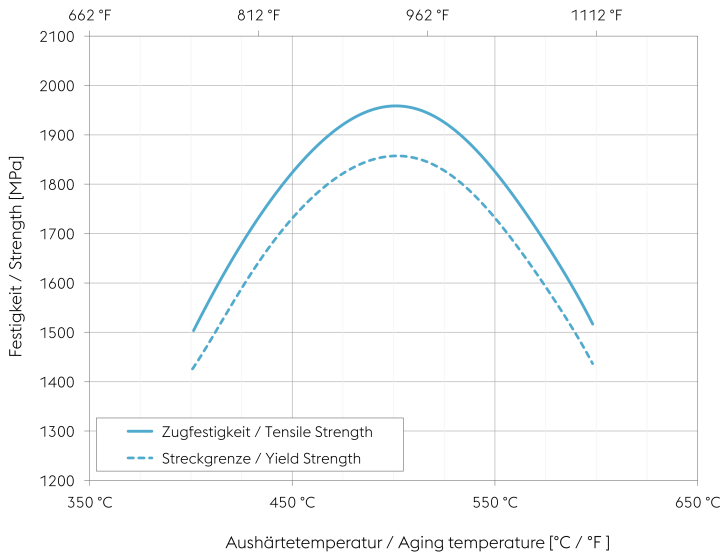
Solution annealing

| | | |
|-------------|--------|-----------------|
| Temperature | 820 °C | 1 hour air, gas |
|-------------|--------|-----------------|

Precipitation hardening

| | | |
|-------------|--------|--|
| Temperature | 430 °C | 3 hours / air 1720 to 1870 N/mm ² |
| Temperature | 480 °C | 3 hours / air 1860 to 2000 N/mm ² |

Ageing chart



Aging:

Solution annealed 820°C (1508°F) / 1 hour / air
Aging time: 3 hours

Physical Properties

| | |
|--|-----------|
| Temperature (°C) | 20 |
| Density (kg/dm ³) | 8.2 |
| Thermal conductivity (W/(m.K)) | 14 |
| Specific heat (kJ/kg K) | 0.46 |
| Spec. electrical resistance (Ohm.mm ² /m) | 0.4 |
| Modulus of elasticity (10 ³ N/mm ²) | 193 |

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

| | | | | | | |
|--|------------|------------|------------|------------|------------|------------|
| Temperature (°C) | 100 | 200 | 300 | 400 | 500 | 600 |
| Thermal expansion (10 ⁻⁶ m/(m.K)) | 10.2 | 10.8 | 11 | 11.4 | 11.8 | 11.8 |

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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ONE STEP AHEAD.