

# PLASTIC MOULD STEELS

## HARDENABLE CORROSION RESISTANT STEEL

### Available Product Variants

Long Products\*

Plates

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

### Product Description

BÖHLER M390 MICROCLEAN is a martensitic chromium steel produced with powder metallurgy. Due to its alloying concept this steel offers extremely high wear resistance and high corrosion resistance – the perfect combination for best application properties.

### Process Melting

Powder metallurgy

### Properties

- > Toughness & Ductility : good
- > Wear Resistance : very high
- > Machinability : good
- > Dimensional stability : very high
- > Polishability : very high
- > Corrosion resistance : good
- > Micro-cleanliness : very high

### Applications

- > Comps. for Food processing and Animal Feed
- > Shearing / Machine Knives
- > Food processing Industry
- > Plastic Extrusion
- > Glasfibre reinforced plastics
- > Injection Molding
- > Custom Hand Knives
- > Medical
- > Powder Pressing
- > Screws and Barrels
- > Electronic Industry
- > Packaging
- > Pill punching dies

### Chemical composition (wt. %)

| C   | Si  | Mn  | Cr | Mo | V | W   |
|-----|-----|-----|----|----|---|-----|
| 1.9 | 0.7 | 0.3 | 20 | 1  | 4 | 0.6 |

### Delivery condition

#### Soft annealed

Hardness (HB) max. 280

## Heat treatment

| Stress relieving        |                                       |   |
|-------------------------|---------------------------------------|---|
| Temperature             | 650 °C   1,202 °F                     | After through-heating, soak for 4 hours in a neutral atmosphere. Furnace cooling down to 300 °C (570 °F), followed by air. After hardening and tempering, stress relieving has to be performed 50°C (90°F) below last tempering temperature.  |
| Hardening and Tempering |                                       |   |
| Temperature             | 1,100 to 1,180 °C   2,012 to 2,156 °F | For hardening hold at temperature for 20 to 30 min (for hardening temperature 1180°C/ 2156°F 5-10 min). An optional sub-zero treatment at -80°C/-112°F can be applied after hardening. For highest corrosion resistance, temper once for a minimum of 2h at 200-300°C/ 392-572°F. For best wear resistance, temper twice for a minimum of 2h at 540-560°C/ 1004-1040°F (without sub-zero treatment) or 510-530°C/950-986°F (with sub-zero treatment). After each heat treatment step, material should be cooled down to approx. 30°C! |

## Physical Properties

| Temperature (°C   °F)   | 20   68       |
|---|---------------|
| Density (kg/dm <sup>3</sup>   lb/in <sup>3</sup> )  | 7.54   0.27   |
| Thermal conductivity (W/(m.K)   BTU/ft h °F)  | 16.5   9.53   |
| Specific heat (kJ/kg K   BTU/lb °F)   | 0.48   0.1146 |
| Spec. electrical resistance (Ohm.mm <sup>2</sup> /m   10 <sup>-4</sup> Ohm.inch <sup>2</sup> /ft) | -             |
| Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup>   10 <sup>3</sup> ksi)                   | 227   32.92   |

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

| Temperature (°C   °F)  | 100   212   | 200   392   | 300   572   | 400   752   | 500   932   |
|--|-------------|-------------|-------------|-------------|-------------|
| Thermal expansion (10 <sup>-6</sup> m/(m.K)   10 <sup>-6</sup> inch/inch.°F) | 10.38   5.8 | 10.67   5.9 | 10.96   6.1 | 11.24   6.2 | 11.56   6.4 |

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

**Sheet & Plates:** Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact voestalpine BÖHLER Bleche GmbH & Co KG.

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