

# PLASTIC MOULD STEELS

## HARDENABLE CORROSION RESISTANT STEEL

### Application Segments

Plastic Mould

### 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 M333 ISOPLAST is a corrosion-resistant, martensitic plastic mold steel with excellent polishability and toughness for products with highest surface requirements. BÖHLER M333 ISOPLAST is also approved for food and beverage contact.

### Process Melting

Airmelted + Remelted

### Properties

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

### Applications

- |  |                                 |                            |
|--|---------------------------------|----------------------------|
| > Components for food processing and animal feed | > Injection Moulding            | > Plastic Extrusion        |
| > Standard Parts (Moulds, Plates, Pins, Punches) | > Blow Molding                  | > Consumer Goods - General |
| > Lamps/Lenses for Automotive                    | > Packaging industry            | > Camera lenses            |
| > Components for Displays                        | > Electronic industry           | > Screws and Barrels       |
| > Hotrunner systems                              | > Glasfibre reinforced plastics | > Cutting                  |
| > Extrusion                                      | > Mineral Processing            | > Pumping                  |
| > Wear Applications                              | > Mechanical Engineering        | > Filling                  |

### Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	Ni	V	N
0.24	0.2	0.35	13.25	+	+	+	+

## Delivery condition

<b>Soft annealed</b>	
Hardness (HB)	max. 220

## Heat treatment

<b>Stress relieving</b>		
Temperature	max. 650 °C	Soft annealed material: For stress relief annealing after mechanical machining, hold the material at temperature in a neutral atmosphere for 1-2 hours after complete heating, then slowly cool in the furnace at 20°C [68 °F]/hour to 200°C [392 °F], then cool in air.
Temperature		Hardened and tempered material: The temperature for stress relief annealing should be approx. 50°C [122 °F] below the previously selected tempering temperature. Other procedure as for stress relief annealing of soft annealed material.

## Hardening and Tempering

Temperature	max. 980 °C	For hardening, hold the material at the specified temperature for 15-30 minutes after complete heating and quench quickly. Cool the material to approx. 30°C [86 °F]. Immediately afterwards, the material can be deep-frozen for 2 hours (at -80°C [-112 °F]) for residual austenite transformation. Tempering should also be carried out immediately.
Temperature	250 to 350 °C	Tempering treatment: For maximum corrosion resistance, temper the material once for 1 hour/20 mm material thickness, but for at least 2 hours. Achievable hardness - see tempering diagram.
Temperature	500 to 510 °C	Tempering treatment: For optimum toughness and hardness values (without sub-zero cooling), temper the material 3 times for 1 hour/20 mm material thickness, but at least 2 hours. After each heat treatment step, cool the material to approx. 30°C [86 °F]. Achievable hardness - see tempering diagram.
Temperature	500 to 520 °C	Tempering treatment: For optimum toughness and hardness values (with sub-zero cooling), temper the material 3 times for 1 hour/20 mm material thickness, but at least 2 hours. After each heat treatment step, cool the material to approx. 30°C [86 °F]. Achievable hardness - see tempering diagram.

## Physical Properties

<b>Temperature (°C)</b>	<b>20</b>
Density (kg/dm <sup>3</sup> )	7.7
Thermal conductivity (W/(m.K))	22.9
Specific heat (kJ/kg K)	0.46
Spec. electrical resistance (Ohm.mm <sup>2</sup> /m)	-
Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup> )	216

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

<b>Temperature (°C)</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>
Thermal expansion (10 <sup>-6</sup> m/(m.K))	10.5	11	11	11.5	12

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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