

# 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 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
- > Standard Parts (Molds, Plates, Pins, Punches)
- > General Components for Mechanical Engineering
- > Packaging industry
- > Electronic industry
- > Glasfibre reinforced plastics
- > Injection Molding
- > Blow Molding
- > Lamps/Lenses for Automotive
- > Camera lenses
- > Screws and Barrels
- > Plastic Extrusion
- > Consumer Goods - General
- > Medical
- > Components for Displays
- > Hotrunner systems

### Chemical composition (wt. %)

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

### Delivery condition

#### Soft annealed

Hardness (HB) | max. 220

## Heat treatment

Stress relieving		
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

Temperature (°C)	<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 ...

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

**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.

*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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