

PLASTIC MOULD STEELS

HARDENABLE CORROSION RESISTANT STEEL

Available Product Variants

- Long Products
- Plates

Product Description

Advanced martensitic stainless chromium steel for plastic molds. By electroslag remelting and optimization of the chemical composition, BÖHLER M310 ISOPLAST offers many advantages.

Process Melting

- Airmelted + Remelted

Properties

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

Applications

- > Comps. for Food processing and Animal Feed
- > Plastic Extrusion
- > Consumer Goods - General
- > Medical
- > Components for Displays
- > Hotrunner systems
- > Food processing Industry
- > Standard Parts (Molds, Plates, Pins, Punches)
- > General Components for Mechanical Engineering
- > Packaging
- > Electronic Industry
- > Injection Molding
- > Blow Molding
- > Lamps/Lenses for Automotive
- > Camera lenses
- > Screws and Barrels

Technical data

Material designation		Standards	
~1.2083	SEL	4957	EN ISO
~SUS420J2	JIS	A681	ASTM
X40Cr13	EN	AFNOR Z40C14	Others
X40Cr14			
~420	AISI		

Chemical composition (wt. %)

C	Si	Mn	Cr	V
0.38	0.7	0.45	14.3	0.2

Material characteristics

	Corrosion resistance	Machinability in as supplied condition	Polishability	Toughness	Wear resistance
BÖHLER M310 ISOPLAST®	★★★★	★★★★	★★	★★	★★
BÖHLER M333 ISOPLAST®	★★★★★	★★★★	★★★★★	★★★★★	★★
BÖHLER M340 ISOPLAST®	★★★	★★★	★★	★★	★★★
BÖHLER M368 MICROCLEAN®	★★★★	★★★	★★★★	★★★	★★★
BÖHLER M390 MICROCLEAN®	★★	★	★★★★	★★	★★★★★
BÖHLER M398 MICROCLEAN®	★★	★	★★★★	★★	★★★★★

Delivery condition

Soft annealed

Hardness (HB)	max. 225
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Heat treatment

Hardening and Tempering

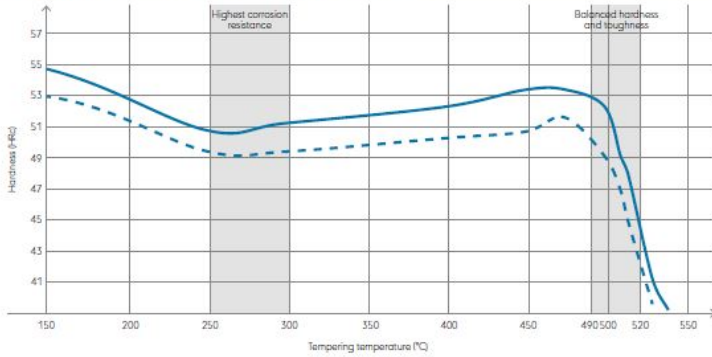
Temperature	1000 to 1050 °C 1832 to 1922 °F	After through heating, hold for 15 to 30 minutes. After hardening, tempering to the desired working hardness, see tempering chart.
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Stress relieving

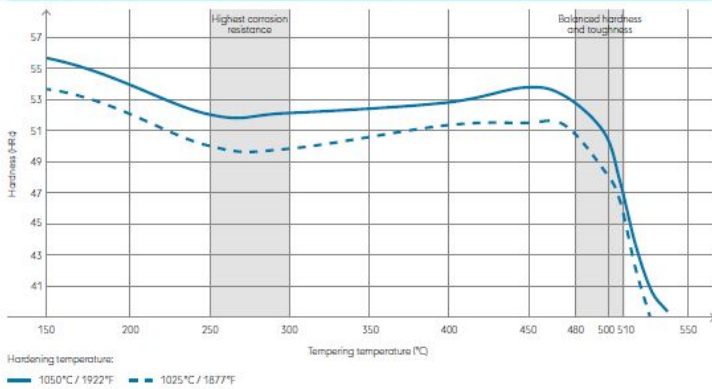
Temperature	50°C / 90°F below last tempering temperature.
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Tempering Chart

Tempering diagram (vacuum heat treatment without subzero cooling)



Tempering diagram (vacuum heat treatment with subzero cooling)



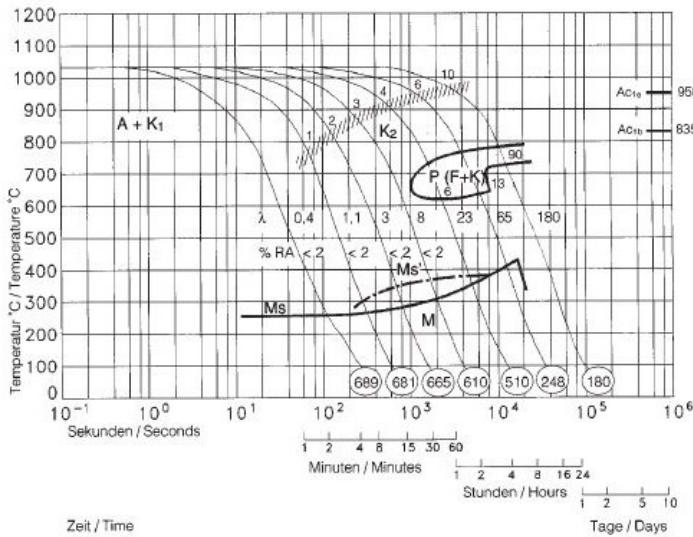
Continuous cooling CCT curves

ZTU-Schaubild für kontinuierliche Abkühlung

Continuous cooling CCT curves

Austenitising temperature: 1025°C (1877°F)
Holding time: 30 minutes

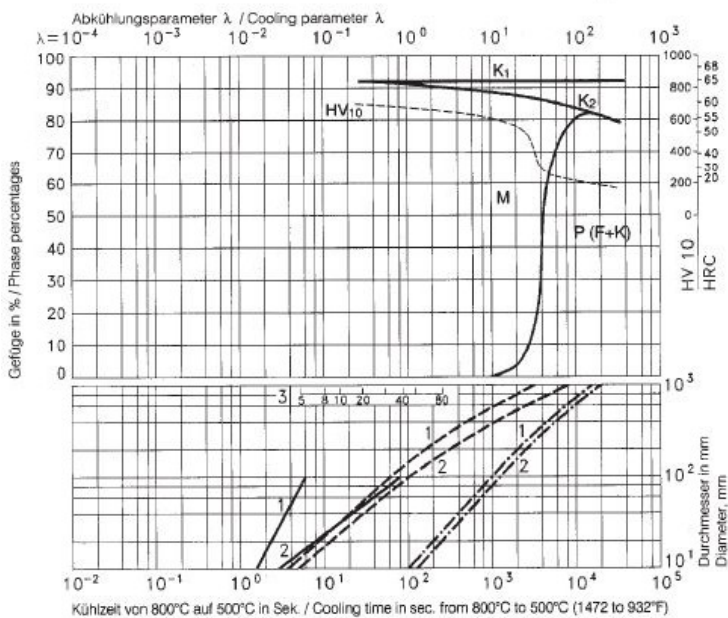
O Vickers hardness
1...90 phase percentages
0.4...180 cooling parameter, i.e. duration of cooling from 800-500°C (1472-932°F) in $s \times 10^{-2}$
K,... carbides not dissolved during austenitization (8%)
K,... carbides newly formed during cooling
Ms-Ms'... range of grain boundary martensite formation



Quantitative phase diagram

Gefügemengenschaubild

Quantitative phase diagram



A... Austenite
F... Ferrite
K... Carbide
M... Martensite
P... Pearlite

— Water cooling
- - - Oil cooling
- • - Air cooling

1... Edge or face
2... Core
3... Jominy test: distance from the face end

Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	7.68 0.28
Thermal conductivity (W/(m.K) BTU (IT) ft/hr/ft ² /F)	19.5 11.27
Specific heat (J/(kg.K) BTU (IT) lb/F)	460 109.87
Spec. electrical resistance (Ohm.mm ² /m 10 ⁻⁴ Ohm.inch ² /ft)	0.65 3.07
Modulus of elasticity (10 ³ N/mm ² 10 ³ ksi)	217 31.47

Thermal Expansions

Temperature (°C °F)	100 212	200 392	300 572	400 752	500 932
Thermal expansion (10 ⁻⁶ m/ (m.K) 10 ⁻⁶ inch/(inch.F))	10.63 5.9	10.94 6.1	11.29 6.3	11.66 6.5	12 6.7

For more information see <https://www.voestalpine.com/boehler-edelstahl/de/>

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