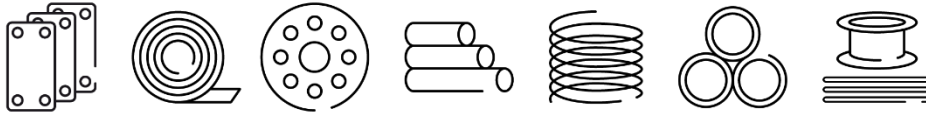


# HASTELLOY® B-3® alloy | NiMo29Cr | 2.4600

## High Performance Alloys Data Sheet



Zapp is Certified to ISO 9001



### HASTELLOY® B-3® alloy

belongs to the group of highly corrosion-resistant nickel-molybdenum alloys.

The alloy is characterized by very good resistance in reducing media, e.g. in hydrochloric acid in the whole range of concentrations and temperatures.

The material can also be used in hydrogen chloride as well as in sulfuric, acetic and phosphoric acid.

The good resistance against pitting, crevice corrosion, chlorine-induced stress-crack corrosion, knife-edge corrosion, wear corrosion and corrosion in the heat affected zone allow a wide range of applications.

Components such as iron or copper salts with oxidizing effects restrict the scope of application of the material.

In the temperature range of approx. 500 – 820 °C, the advanced HASTELLOY® B-3® alloy exhibits a considerably lower tendency to precipitate.

This effect has enabled significant improvement in processing characteristics and corrosion resistance properties compared with those of HASTELLOY® B-2 alloy.

### Applications

- Plants for the production and processing of hydrochloric, sulfuric, acetic and phosphoric acids
- Plants for ethylbenzene production
- Pressure vessels for chloroprene production
- Plants for the production of phenol from isopropyl benzene
- Pyrolysis plants for the production of acetic anhydride

Further information under:

<https://www.zapp.com/en-us/materials/high-performance-alloys-ni-co-ti>

### Specifications

DIN Designation	NiMo29Cr
DIN Material Number	2.4600
VdTÜV Datasheet	517
UNS	N10675
DIN	17744, 17750, 17751, 17752, 17753
ASTM	B 333, B 335, B 564, B 619, B 622, B 626
ASME	SB 333, SB 335, SB 619, SB 622, SB 626

### Delivery Forms

Sheet	hot rolled, solution annealed, pickled or de-scaled
Sheet	cold rolled, bright/solution annealed
Strip	cold rolled, bright/solution annealed
Pipe	longitudinally welded or seamless, bright/solution annealed
Bar	rolled or forged, solution annealed
Wire	rolled or drawn
Forging	solution annealed, machined on request
Welding filler metal	welding bar, wire electrode coated bar electrode

Do you require other delivery forms or finishes? We will be glad to discuss your needs with you over the phone.

## Processing Instructions

HASTELLOY® B-3® alloy is cold and hot formable. With cold forming grades over 15 %, a final solution annealing is required in order to obtain optimum corrosion resistance.

Hot forming is carried out in the temperature range from 1,232 to 982 °C.

Subsequent solution annealing followed by rapid cooling is required.

Prior to heating, all workpieces should be free of oil, grease, carbon, sulfur-containing residues and other contaminants.

The furnace should be adjusted to maintain a neutral to slightly oxidizing atmosphere.

## Heat Treatment

Solution annealing: 1,050 – 1,080 °C

Cooling: water, compressed air or protective gas

## Welding

The welding of HASTELLOY® B-3® alloy is typically carried out on like materials using shield gas processes GTAW and GMAW as well as the arc welding process.

The semi-finished products should also be in a stress-free, metallic bright condition and free of dirt.

In order to achieve optimal corrosion resistance, care must be taken to apply a minimum of heat during welding.

Preheating or secondary heat treatment is generally unnecessary.

## Chemical Composition\*

	C	Cr	Mo	Fe	Si	Mn
Min.	-	1.0	27.0	1.0	-	-
Max.	0.01	3.0	32.0	3.0	0.10	3.0
	Co	P	S	W	Ni	
Max.	3.0	0.03	0.015	3.0	Bal.	

\* weight %

## Physical Properties

Melting temperature range	1,370 – 1,418 [°C]
Density*	9,220 [kg · m <sup>-3</sup> ]
Modulus of elasticity* (approximately)	217 [GPa]
Specific heat*	373 [J · kg <sup>-1</sup> · K <sup>-1</sup> ]
Thermal conductivity*	11.2 [W · m <sup>-1</sup> · K <sup>-1</sup> ]
Coefficient of thermal expansion 20-93°C	10.6 x 10 <sup>-6</sup> [K <sup>-1</sup> ]
Specific electrical resistivity*	1.37 [Ω · mm <sup>2</sup> · m <sup>-1</sup> ]

\* at room temperature

## Mechanical Properties at Room Temperature

Semi-finished product form	Sheet ≤ 65 mm thickness	Forging/bar ≤ 90 mm Ø or equivalent area
R <sub>p 0,2</sub> min [MPa]	340	325
R <sub>m</sub> [MPa]	700 – 1,000	700 – 950
A min [%]	40	40

\* condition: solution annealed

## Mechanical Properties at Elevated Temperatures\*

Semi-finished product form	Strength parameter	Temperature °C			
		100	200	300	400
Sheet ≤ 65 mm thickness	R <sub>p 0,2</sub> [MPa]	315	285	270	255
Forging/bar > 90 mm Ø or equivalent area	R <sub>p 0,2</sub> [MPa]	300	275	255	240

\* minimum values

## Welding Filler Materials

	DIN Material No.	DIN Designation	VdTÜV Data sheet No.	DIN EN ISO	AWS/ASME
Bar (GTAW)	2.4695	SG-NiMo30Cr	7616	18274	A5.14
				Ni1067	ER NiMo-10
Wire (GMAW)	2.4695	SG-NiMo30Cr	7615	18274	A5.14
				Ni1067	ER NiMo-10
Coated Electrodes (MMA)	2.4696	EL-NiMo28Cr	7617	14172	A5.11
				Ni1067	E NiMo-10

We will be glad to provide you with information and instructions on machining and processing and on the selection of suitable welding filler materials. Please do not hesitate to call us.

® HASTELLOY is a registered trademark of our contracted manufacturer HAYNES International, Inc., Kokomo, Indiana, USA.

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