

## Wrought copper-nickel alloy **NB 10** alloy 2310

**NB 10** is a construction material with very good corrosion resistance, especially in contact with fuels, lubricants and seawater. The fouling by marine organisms is very low. The material does not tend to stress corrosion cracking. NB 10 has a high toughness at low temperatures and is therefore very suitable for cryogenics.

ZOLLERN brand	NB 10
EN designation	CuNi10Fe1Mn
EN material no:	CW352H

EN 12420, 12163  
AD 2000 "Pressure vessel" - AD W 6/2  
EN 1653 "Plates, circular blanks"  
ASTM B151 and B171

### // National designations / ISO

DIN	CuNi10Fe1Mn
DIN / WL	2.0872 / 2.1972
ISO	CuNi10Fe1Mn
USA	C70600
GB	CN102 DEF STAN 02-879
F	U - N10Fe1M

### // Composition (weight by per cent in %)

Cu	Ni	Fe	Mn	C
Rest	9.0 – 11.0	1.0 – 2.0 1.0 – 1.8 <sup>1)</sup>	0.5 – 1.0	max. 0.05
Co	P, Pb, Sn	S	Zn	Other
max. 0.1	max. 0.02	max. 0.05	max. 0.5	max. 0.2

<sup>1)</sup> ASTM B151 and B171 / ASME B151 and B171

### // Strength properties at room temperature

	(minimum values)			
	R <sub>p0.2</sub> N/mm <sup>2</sup>	R <sub>m</sub> N/mm <sup>2</sup>	A <sub>5</sub> %	HB
[ 1 ] EN 12420:1999 [ 2 ] EN 12163:2016 min. 200 Kg [ 3 ] AD 2000 W 6/2 [ 4 ] EN 1653:2000 [ 5 ] ASTM B151 / ASME B 151 [ 6 ] ASTM B171 / ASME B 171				
[ 1 ] Forged pieces and die-cast parts	100	280	25	70
[ 2 ] Rods, drawn up to 20 mm Ø thickness or SW	150	350	10	100
[ 3 ] Forgings according to AD W 6/2 up to 100 mm thickness	100	280	30	70
[ 4 ] Plates R270 up to 125 mm thickness	100	270	30	~85
[ 5 ] Rods thickness 25 - 80 mm [ 6 ] Plates all wall thicknesses	105	275	30	-

### // Strength properties at elevated temperatures (reference values)

Temperature	°C	20	200	300	400	500
0.2% limit	R <sub>p0.2</sub> N/mm <sup>2</sup>	125	103	100	90	80
Tensile strength	R <sub>m</sub> N/mm <sup>2</sup>	330	275	245	235	175
Elongation	A <sub>5</sub> %	36	28	25	24	18

### // Physical properties

Density at 20 °C	8.9 kg/dm <sup>3</sup>
Melting temperature/range	approx. 1110 - 1145°C
Coefficient of linear expansion	
from -200° to 20°C	13 x 10 <sup>-6</sup> °C <sup>-1</sup>
from 20° to 300°C	17 x 10 <sup>-6</sup> °C <sup>-1</sup>
Specific heat at 20°C	0.377 J/g x °C
Thermal conductivity at 20°C	0.50 W/cm x°C
Electr. conductivity at 20°C	4 - 6 MS/m 7 - 10% IACS
Electr. resistance at 20°C	0.167 - 0.25 Ω mm <sup>2</sup> /m
Temperature coefficient of the electrical resistance (0 - 100°C)	0,0007 °C <sup>-1</sup>
Permeability	< 1.5
Young's modulus	135 KN/mm <sup>2</sup>

### // Dynamic strength values at room temperature (reference values)

Rotational bending fatigue strength R <sub>bw</sub> at 100 x10 <sup>6</sup> load cycles, 30% cold-formed	150 N/mm <sup>2</sup>
Notched impact energy (ISO - V/KV)	140 joules

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### Areas of application

- Pipeline parts such as flanges and weld neck collars for seawater transport with calculated flow velocities of up to up to approx. 3.2 m/s
- Tube sheet plate for heat exchanger
- Parts for oil and water coolers
- Apparatus construction
- Cryogenics
- Drinking water production plants from seawater
- Corrosion-resistant screws, bolts and nuts

### Machinability

**NB 10** has good hot and cold formability. Hot forming range approx. 800 - 1,050°C. During machining, relatively long flow chips due to the high toughness. The machinability index is 20 where CuZn39Pb3 = 100.

<b>Relaxation annealing</b>	280 – 450°C
<b>Soft annealing</b>	620 - 750°C
<b>Soft soldering</b>	very easily possible
<b>Brazing</b>	very easily possible
<b>Welding</b>	Gas shielded arc welding TIG, MIG or manual electrode welding is possible, as well as resistance welding. Filler wire S-CuNi10Fe = 2.0873, S-CuNi30Fe = 2.0837
<b>Surface treatment</b>	good mechanically and electrochemically polishable, galvanic coatings are easily executable

