

Wrought copper-nickel-aluminium alloy **NB 1** alloy 2300

NB 1 according to WL 2.1504 Aerospace is an amagnetic construction material with very high strength. The material is resistant to corrosion and sea water. The fouling by marine organisms is very low. NB 1 has a high resistance to cavitation and erosion, is abrasion-resistant and very suitable as a bearing material in conjunction with stainless steel shafts.

ZOLLERN brand	NB 1
EN designation	None
EN material no:	None

// National designations	
WL	CuNi14Al3
WL	2.1504
F	≈ U-N14A2 ≈ NF L 14-702

≈ (substantial coherence)

// Composition (weight by per cent in %)					
Cu	Ni	Fe	Al	Mn	
Rest	13.0 – 16.0	max. 1.5	2.0 – 3.0	max. 1.0	
Zn	Si	Other			
max. 0.3	max. 0.1	max. 0.5			

// Strength properties at room temperature				
WL 2.1504	(minimum values)			
	R _{p0.2} N/mm ²	R _m N/mm ²	A ₅ %	HB
Forgings and bars 15 mm to 50 mm thickness according to WL 2.1504	640	780	10	230
Forgings and bars from 50 to 80 mm thickness according to WL 2.1504	590	780	10	225
Forgings, and bars over 80 mm thickness, Rings > 50 mm thickness ¹⁾	540	740	10	210
Rings up to 50 mm thickness ¹⁾	570	760	10	220

¹⁾ Dimensions not included in WL 2.1504, Zollern values

// Strength properties at elevated temperatures (reference values)						
Temperature	°C	20	200	300	400	500
0.2% limit	R _{p0.2} N/mm ²	650	590	550	500	380
Tensile strength	R _m N/mm ²	830	820	790	620	390
Elongation	A ₅ %	14	11	8	2	1

// Physical properties	
Density at 20 °C	8.5 kg/dm ³
Melting temperature/range	approx. 1120 - 1150°C
Coefficient of linear expansion from 20° to 100°C	16 x 10 ⁻⁶ °C ⁻¹
Specific heat at 20°C	0.415 J/g x °C
Thermal conductivity at 20°C	0.71 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 ² /m
Permeability	< 1.01
Young's modulus	143 KN/mm ²

// Dynamic strength values at room temperature (reference values)	
Rotational bending fatigue strength R _{bw} at 20 x 10 ⁶ load cycles	190 N/mm ²
Notched impact energy (ISO - V/KV)	30 joules

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Areas of application

NB 1 is suitable for highly stressed parts due to its high strength values even with simultaneous corrosion stress.

For example

- Valve parts such as spindles, seat rings and hydraulic parts are manufactured
- High-strength, amagnetic screws, bolts and nuts for seawater use
- Gears, bevel gears
- Slot lock wedges for generator rotors
- Cap rings for electric motors
- Inserts and cores in plastic injection moulds
- Bearings in aircraft landing gears

Machinability

NB 1 is easy to machine.

The machining index is approx. 20 due to the high strength, whereby $CuZn39Pb3 = 100$. Cutting and die-sinking is possible. NB 1 is not suitable for cold forming. Carbide tools are used for turning and milling, and sharp drill bits for drilling and thread cutting are advantageous.

Relaxation annealing	300 – 450°C
Soft annealing	-
Soft soldering	suitable
Brazing	suitable, but fluoride and chloride containing fluxes are recommended
Welding	not recommended, similar additive materials of the same type are not available. Welding with non-matching filler metals such as $CuAl9Ni4Fe2Mn2 = CF310G$ or $S-CuNi30Fe = 2.0837$ is possible.
Surface treatment	polishing and galvanic treatments are possible

