



Related specifications: DIN 2.1504, DTD900/4805

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NIBRON SPECIAL® is an extra high strength copper nickel alloy developed by Columbia Metals that maximises both strength and corrosion resistance. Sometimes referred to as a nickel bronze, NIBRON® contains additions of aluminium, iron and manganese that join with the copper and nickel to achieve its exceptional properties. The resulting high strength, outstanding corrosion resistance, low magnetism, anti-galling, high conductivity and good fabrication characteristics combine to create a material suited to widely differing industries. Although suited primarily to the tough extremes of marine or offshore oil and gas environments, NIBRON® has also established itself for critical components in many other industrial sectors including aerospace, electrical, chemical and automotive.



The high mechanical strength of NIBRON® is realised in the “as delivered” condition without the need for complex heat treatments. It is significantly better than that of the nickel aluminium bronzes with equivalent ductility levels and even matches the requirements of B7 bolting steel, making it one of the strongest copper alloys currently produced. NIBRON® also offers a retention of its properties from cryogenic temperatures up to ~300°C, with the mechanical properties including its impact strength being maintained - if not enhanced - at temperatures as low as at least –196°C.

- VERY HIGH MECHANICAL PROPERTIES
- OUTSTANDING CORROSION RESISTANCE
- EXCELLENT WEAR & GALLING RESISTANCE
- VERY LOW MAGNETIC PERMEABILITY
- GOOD THERMAL CONDUCTIVITY
- READILY BRAZED AND WELDED
- GOOD MACHINABILITY RATING
- RESISTANT TO HYDROGEN EMBRITTLEMENT
- HIGH DUCTILITY

The corrosion resistance of NIBRON® is outstanding in a variety of media and is one of its main advantages over other alloys. It demonstrates superior marine corrosion resistance to aluminium bronzes as well as the 90/10 and 70/30 cupronickels. It is galvanically compatible with a wide range of other materials and has an electrode potential in seawater of –0.18V vs a Standard Copper Electrode. NIBRON® has also been found to be resistant to stress corrosion cracking in many other marine environments including those contaminated with ammonia, amine and sulphide. Furthermore, it is not susceptible to hydrogen embrittlement where many nickel and stainless steel materials would suffer.

NIBRON® retains respectable thermal and electrical conductivity values. It also offers an exceptionally low magnetic permeability (<1.01) ideal for non-magnetic instruments and components.

NIBRON® has a good machinability and dimensional stability. With a machinability rating of 30 (free cutting brass = 100) it is readily machined and possesses a greater resistance to galling and seizure than other alloys such as K500 and duplex stainless steels. An additional fabricational advantage is that NIBRON® is inherently weldable, both to itself and 316 stainless steel using a conventional TIG welding process.

The unique combination of properties NIBRON® offers means it is the first choice for many critical mechanical engineering components where a “fit and forget” approach to material selection is demanded. It has enabled its use in aircraft landing gear, steering gear, bearing bushes and control surface components, defence equipment such as tank turret gearbox gears, periscopes and shipbuilding components, high performance IC engine bearing bushes and shafts, valve and pump trim, shafts, spindles and gears, marine shafts, bearing bushes and fasteners, electrical and hydraulic connectors, fasteners and other sub-sea components for offshore oil and gas production.

## PLEASE CONTACT US FOR AN IMMEDIATE QUOTATION OR TECHNICAL ADVICE

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# Nibron Special®

## Technical Data

### Nominal Composition (%)

Cu	Ni	Al	Fe	Mn
Rem	14.5	3	1.5	0.3

### Mechanical Properties (specification minima)

	≤65mm dia	>65mm dia
<b>Ultimate Tensile Strength (N/mm<sup>2</sup>)</b>	850	770
<b>0.2% Proof Strength (N/mm<sup>2</sup>)</b>	630	555
<b>Elongation (%)</b>	12	12
<b>Hardness (HB)</b>	240	229

### Typical Physical Properties

<b>Density (g/cm<sup>3</sup>)</b>	8.50
<b>Melting Range (°C)</b>	1080 - 1100
<b>Young's Modulus (KPa)</b>	141
<b>Thermal conductivity (20°C; W/mK)</b>	44 - 46
<b>Coeff. Thermal Exp. (0-400°C; m/m°K x 10<sup>-6</sup>)</b>	16.4
<b>Electrical Resistivity (microohm/m)</b>	0.17
<b>Magnetic Permeability</b>	<1.001

### Round Bar Weight and Stock Sizes

Diameter ins	Weight		Diameter ins	Weight		Diameter ins	Weight	
	kg/ft	kg/m		kg/ft	kg/m		kg/ft	kg/m
0.500	0.33	1.09	45mm	4.12	13.52	3.125	12.82	42.06
0.625	0.52	1.70	1.875	4.67	15.32	3.250	14.02	46.00
0.750	0.74	2.44	2.000	5.31	17.42	3.500	16.27	53.37
0.875	1.02	3.34	2.125	5.99	19.65	3.750	18.67	61.27
25mm	1.27	4.17	2.250	6.73	22.07	4.000	21.25	69.72
1.000	1.33	4.35	2.375	7.49	24.58	4.500	26.89	88.23
1.125	1.68	5.52	2.500	8.30	27.23	5.000	33.20	108.93
1.250	2.07	6.80	65mm	8.60	28.21	5.500	40.16	131.76
1.375	2.51	8.23	2.625	9.05	29.68	6.000	47.83	156.94
1.500	2.99	9.80	2.750	10.04	32.94	7.000	65.08	213.48
1.625	3.50	11.50	75mm	11.45	37.55	8.000	85.00	278.88
1.750	4.07	13.35	3.000	11.95	39.21	9.000	107.56	352.92

NB Weight data for guidance only