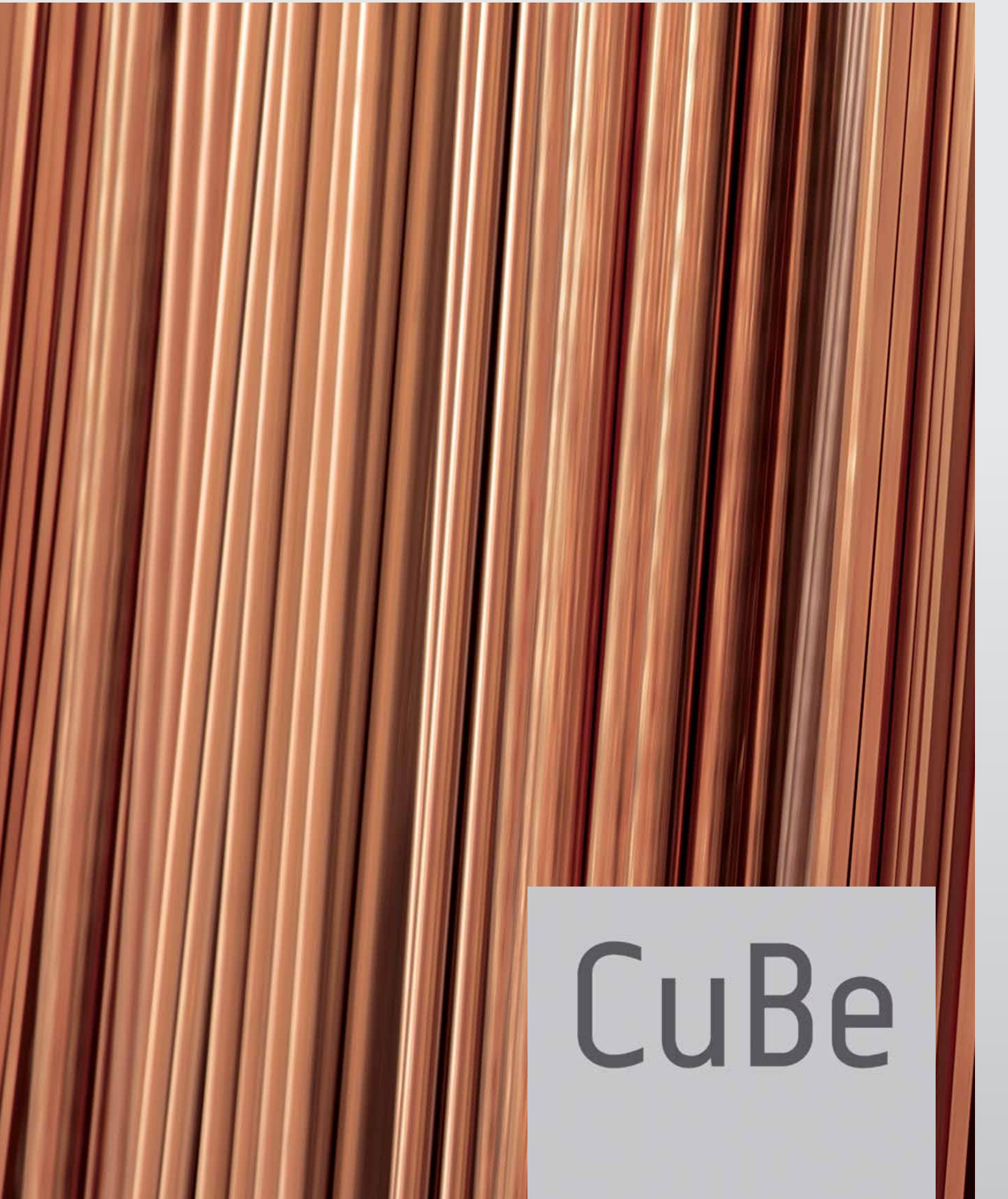


Copper Beryllium



CuBe

General information

Alloy designation	Composition	Product form	Characteristics
Berylco 25 Cu Be 2 CW 101 C C17200	Be: 1.8 - 2 % Co: 0.3 % max. Co + Ni + Fe: 0.6 % max. Cu + additives: 99.5 min.	Strips Rods Wires	Very high strength alloy
Berylco 33/25 Cu Be 2 Pb CW 102 C C17300	Berylco 25 With added PB: 0.2 % min.	Rods Wires	Free machining very high strength alloy
Berylco 165 Cu Be 1.7 CW 100 C C17000	Berylco 25 But Be: 1.6 - 1.8%	Strips Rods Wires	High strength alloy recommended for marine applications
Berylco 10 Cu Co 2 Be CW 104 C C17500	Be: 0.4 - 0.7% Co: 2.4 - 2.7% Cu + additives: 99.5 min.	Strips Rods Wires	Good strength and conductivity
Berylco 14 Cu Ni 2 Be CW 110 C C17510	Be: 0.2 - 0.6 % Ni: 1.8 - 2.2 % Cu + additives: 99.5 min.	Strips Rods Wires	Good strength and conductivity

Physical properties after tempering	Berylco 25, 165, 33/25	Berylco 10, 14
Melting point °C	865 to 980	1030 to 1070
Specific weight (g/cm ³)	8.25	8.75
Linear coefficient of expansion between 20° and 200°, 10 ⁻⁶ per °C	17.0	17.6/18.0
Fatigue strength in N/mm ² for 108 cycles	≥270	≥240
Modulus of rigidity in N/mm ²	50,000	51,500
Electrical resistivity at 20 °C in μΩ cm ² /cm max.	7.8	3.8
Modulus of elasticity (YOUNG) in N/mm ²	130,000	133,000

Reference specifications		
Authority	Specifications	
	Strips	Rods and wires
AFNOR	A 51 109	A 51 114, A 51 414, L 14 709
EN	EN 1654	EN 12 163, EN 12 164, EN 12 165, EN 12 167
DIN	DIN 17 670, 17 666, 1777	DIN 17 672, 17 666, 1756
British Standard	BS 2870	BS 2873, 2874
ASTM	B - 194, B - 534	B-196, B-197
FEDERAL USA	QQ - C - 533	QQ - C - 530
CDA	C - 17 000, C - 17 200, C - 17 500	C - 17 300

Berylco strips – high strength alloys

State	TS (N/mm ²)	YS 0.2 (N/mm ²)	Elongation in 50 mm, min. [%]	VPN	% IACS	Bending radius: t ≤ 1 mm*	
						⊥	//
Strips: Berylco 25, Cu Be 2							
Before tempering							
A	410 - 540	190 - 380	35	90 - 150	15 - 19	0	0
1/4 H	510 - 610	400 - 560	15	130 - 190	15 - 19	0	0
1/2 H	590 - 690	510 - 660	8	180 - 220	15 - 19	t	2t
H	690 - 830	650 - 800	2	215 - 270	15 - 19	2t	5t
Standard tempering: 3 hours at 315 °C for A, 2 hours at 315 °C for 1/4 H - 1/2 H and H							
AT	1130 - 1150	960 - 1210	3	350 - 410	21 - 28		
1/4 HT	1210 - 1400	1020 - 1280	3	360 - 430	21 - 28		
1/2 HT	1260 - 1450	1090 - 1350	1	370 - 440	21 - 28		
HT	1310 - 1520	1130 - 1420	1	380 - 450	21 - 28		
Mill tempered							
AM	690 - 800	480 - 660	16	210 - 250	19 - 28	0.8t	1.2t
1/4 HM	750 - 870	550 - 760	15	235 - 280	19 - 28	1.3t	1.8t
1/2 HM	830 - 960	650 - 850	12	260 - 310	19 - 28	1.5t	2t
HM	930 - 1080	750 - 980	9	290 - 350	19 - 28	2.3t	2.5t
SHM	1030 - 1150	860 - 1020	9	310 - 360	19 - 28	2.5t	3t
XHM	1100 - 1250	930 - 1180	4	345 - 395	19 - 28	3t	4t
XHMS	1200 - 1320	1030 - 1230	3	365 - 420	19 - 28	4t	6t
Special mill tempered for high formability							
1/2 HM - HF	≥ 830	660 - 800	15	255 - 330	19 - 28	0.5t	0.5t
HM - HF	≥ 960	790 - 930	11	285 - 360	19 - 28	1.5t	1.5t
XHM - HF	≥ 1070	930 - 1070	8	330 - 400	19 - 28	2.5t	2.8t
XHMS - HF	≥ 1210	1070 - 1210	5	345 - 430	19 - 28	3.5t	4t

Strips: Berylco 165, Cu Be 1,7							
Before tempering							
A	410 - 530	190 - 380	35	90 - 150	15 - 19	0	0
1/4 H	510 - 610	400 - 560	15	130 - 190	15 - 19	0	0
1/2 H	580 - 690	510 - 660	8	180 - 220	15 - 19	1.8t	2t
H	680 - 830	650 - 800	2	210 - 270	15 - 19	3.5t	5t
Standard tempering: 3 hours at 315 °C for A, (2 hours at 315 °C) for 1/4 H - 1/2 H and H							
AT	1030 - 1260	890 - 1140	3	330 - 380	21 - 28		
1/4 HT	1100 - 1320	930 - 1170	3	340 - 390	21 - 28		
1/2 HT	1170 - 1380	1030 - 1250	1	360 - 410	21 - 28		
HT	1240 - 1450	1060 - 1300	1	370 - 440	21 - 28		
Mill tempered							
AM	690 - 800	480 - 660	16	210 - 250	19 - 28	t	1.2t
1/4 HM	750 - 870	550 - 760	15	235 - 280	19 - 28	1.8t	2t
1/2 HM	830 - 960	650 - 850	12	260 - 310	19 - 28	2t	2.2t
HM	930 - 1080	750 - 980	9	285 - 340	19 - 28	2.3t	2.5t
SHM	1020 - 1150	850 - 1020	9	300 - 360	19 - 28	2.5t	3t
XHM	1100 - 1250	930 - 1170	4	335 - 385	19 - 28	3t	5t

Copper-beryllium alloys bear the highest mechanical properties of all copper alloys.

Berylco strips – high conductivity alloys



State	TS (N/mm ²)	YS 0.2 (N/mm ²)	Elongation in 50 mm, min. (%)	VPN	% IACS	Bending radius: t ≤ 1 mm*	
						⊥	//
Strips: Berylco 10, Cu Co 2 Be & Berylco 14, Cu Ni 2 Be							
Before tempering							
A	250 - 380	140 - 300	20	60 - 130	22 - 25	0	0
1/2 H	410 - 530	340 - 480	5	125 - 160	22 - 25	1.5t	2t
H	480 - 600	370 - 560	2	140 - 185	22 - 25	2t	3t
Standard tempering: 3 hours at 480 °C for A, 2 hours at 480 °C for 1/2 H and H. Delivery is also possible mill tempered.							
AT	680 - 870	550 - 690	8	190 - 250	≥ 45		
1/2 HT	750 - 900	750 - 900	5	215 - 265	≥ 45	1.5t	2t
HT	750 - 950	670 - 900	5	220 - 270	≥ 45	2t	2t
Mill tempered							
HTR	850 - 1040	750 - 970	3	240 - 300	≥ 45	3t	4t
After special process (only for Berylco 14)							
S780	780 - 930	680 - 850	≥ 12	220 - 270	≥ 48	0.3t	0.3t
S880	880 - 1020	780 - 950	≥ 10	250 - 310	≥ 48	0.7t	0.7t

* **Bending radius:** the above values give minimum bending radius for 1mm thickness or less. The bending direction is (⊥) perpendicular or (//) parallel, depending on the direction of the cold reduction. Radius are expressed as a function of the strip thickness "t" and are based on 90° bends.

These alloys with a lower beryllium content have excellent electrical and thermal conductivity, combined with good mechanical properties.

Rods and wires – high strength alloys

As supplied	TS (N/mm ²)	YS 0.2 (N/mm ²)	Elongation in 50 mm, min. (%)	VPN	% IACS
Rods: Berylco 25, Cu Be 2 & Berylco 33 - 25, Cu Be 2 Pb					
Before tempering					
A	420 - 600	170 - 270	35	90 - 150	15 - 19
H (Ø ≤ 25 mm)	620 - 900	550 - 800	5	200 - 250	15 - 19
H (Ø > 25 mm)	600 - 800	500 - 750	5	180 - 240	15 - 19
Standard tempering: 3 hours at 315 °C for A and 2 hours at 315 °C for H					
AT	1150 - 1350	1000 - 1250	3	360 - 410	21 - 28
HT (Ø ≤ 25 mm)	1300 - 1500	1150 - 1400	1	390 - 440	21 - 28
HT (Ø > 25 mm)	1200 - 1500	1050 - 1400	2	380 - 430	21 - 28
Wires: Berylco 25, Cu Be 2 & Berylco 33 - 25, Cu Be 2 Pb					
Before tempering					
A	390 - 540	140 - 250	35		
1/2 H	550 - 780	470 - 750	10		
H	750 - 1140	610 - 960	2		
Standard tempering: 3 hours at 315 °C for A and 2 hours at 315 °C for 1/2 H and H					
AT	1130 - 1300	980 - 1200	3		
1/2 HT	1200 - 1450	1100 - 1350	2		
HT	1270 - 1550	1200 - 1460	1		

Rods – high conductivity alloys

State	TS (N/mm ²)	YS 0.2 (N/mm ²)	Elongation in 50 mm, min. (%)	VPN	% IACS
Rods: Berylco 10, Cu Co 2 Be & Berylco 14, Cu Ni 2 Be					
Before tempering					
A	250 - 380	140 - 240	> 20	70 - 100	20 - 30
H	420 - 550	350 - 520	> 10	110 - 150	20 - 30
Standard tempering: 3 hours at 480 °C for A, 2 hours at 480 °C for 1/2 H and H					
AT	650 - 800	500 - 670	> 10	190 - 250	48 - 60
HT	740 - 900	640 - 800	> 8	210 - 270	48 - 60

Tolerances

Thickness tolerances: ± (mm)		
Thickness	Standard	Precision
Strips: Berylco 10 - 14 & 25		
≤ 0.099	0.004	0.0025
0.10 - 0.149	0.005	0.0035
0.15 - 0.199	0.006	0.004
0.20 - 0.249	0.007	0.005
0.25 - 0.299	0.008	0.006
0.30 - 0.399	0.009	0.007
0.40 - 0.499	0.010	0.008
0.50 - 0.599	0.013	0.009
0.60 - 0.799	0.015	0.010
0.80 - 0.999	0.018	0.015
1.00 - 1.300	0.025	0.020

Note: if supplied A, only standard tolerances are possible.

Width tolerances: ± (mm)				
Thickness	Width	From 3 to 49.9	From 50 to 100	> 100
≤ 0.75	standard	0.08	0.10	0.15
	precision	0.05	0.06	0.10
> 0.75	standard	0.10	0.15	0.20

Straight tolerances max. in mm for 1 m length	
Ratio: width/thickness (mm)	Straightness tolerances max. (S0)
8 - 15	8
15.1 - 30	6
30.1 - 60	4
60.1 - 120	3
> 120	2

If measuring over a different length than 1 m (L1), the value for "S1" is established by the formula: $S1 = S0 \times L1^2$ (where L1 is in mm)

Tolerances			
Berylco 25		Berylco 33-25	
Dia (mm)	± (mm)	Dia (mm)	± (mm)
Bars: Berylco 25 & 33 - 25			
1.4 - 3	h 9: +0. - 0.025	0.9 - 2.3	h 8: +0. - 0.014
3.1 - 6	h 9: +0. - 0.030	2.4 - 3	h 8: +0. - 0.014
6.1 - 10	h 9: +0. - 0.036	3.1 - 6	h 8: +0. - 0.018
10.1 - 18	h 10: +0. - 0.070	6.1 - 10	h 8: +0. - 0.022
18.1 - 25	h 10: +0. - 0.084	10.1 - 13	h 8: +0. - 0.027
25.1 - 30	h 11: +0. - 0.130	13.1 - 18	h 9: +0. - 0.043
30.1 - 50	h 11: +0. - 0.160	18.1 - 25.4	h 9: +0. - 0.052
50.1 - 60	h 11: +0. - 0.190	25.5 - 30	h 10: +0. - 0.084
		30.1 - 40	h 10: +0. - 0.1

Lengths / diameters			
Berylco 25		Berylco 33-25	
Dia (mm)	± (mm)	Dia (mm)	± (mm)
< 25.4	3 m ± 100mm	≤ 3	3 m ± 10mm
25.5 - 45	2 m min.	3.1 - 18	3 m ± 50mm
45.1 - 50.8	1.5 m min.	18.1 - 25.4	3 m ± 100mm
50.9 - 60	1 m min.	25.5 - 40	2 m min.

Note: For Berylco 33 - 25, Cu Be 2 Pb, rods are pointed and chamfered up to Ø 16 mm.

Wires: Berylco 25 & 33 - 25						
Diameters in mm		0.3 - 0.5	0.51 - 2	2.1 - 3.5	3.6 - 4.5	4.6 - 9.5
Tolerances ± (mm)	Standard	0.010	0.020	0.030	0.040	0.050
	Precision	0.005	0.010	0.015	0.020	0.030
						9.6 - 12
						0.100
						0.050

Manufacturing limits – strips, rods and wires



State	Thicknesses		
	min. All alloys	max. Berylco 25 - 165 Berylco 10 - 14	
Strips: Berylco 25, 165, 10 & 14			
A	0.06	1.50	1
1/4 H	0.055	1.35	
1/2 H	0.05	1.2	0.8
H and tempered	0.05	1	0.6

* We also offer:

Slit in small dimensions up to 0.5 mm, traverse wound, coated or machined, also precise lengths or thicknesses greater outside this standard. Please contact us!

Thickness (mm)	Lengths			
	min.		max.	
	Condition	Temper	Berylco 25 - 165	Berylco 10 - 14
Strips: Berylco 25, 165, 10 & 14				
0.05 - 0.199	3	4	215	210
0.20 - 0.299	3	4	420	410
0.30 - 0.399	4	4	420	410
0.40 - 0.499	5	6	420	410
0.50 - 0.799	6	8	420	410
0.80 - 0.999	8	12	420	410
1.00 - 1.199	10		420	410
1.2 - 1.5	12		420	410

State	Rods - diameter			
	Berylco 25		Berylco 33/25	
	min.	max.	min.	max.
Rods and wires: Berylco 25, 165 & 33-25				
A and AT	6.35	67	6.35	40
H	1	60	1	35
HT	10	60	10	35

State	Wires - diameter			
	Berylco 25 min. max.		Berylco 33/25 min. max.	
A	0.8	13	0.8	13
1/2 H	0.7	13	0.7	13
H	0.3	13	0.3	13

We can also deliver square, hexagonal or rectangular rods, cold drawn or hot worked, depending on the dimensions. Please contact us!

Contact



Notz Metal Ltd

With over 100 years of experience and through constant customer focus, Notz Metal Ltd is specialising in its core business: trading of high-grade steel, stainless steel, non-ferrous metals and special materials, their semi-finished products, as well as the subsequent processing and precision processing. The products serve as primary materials in numerous important industrial markets.

Notz Metal Ltd represents a number of well-renowned large steel producers and stocks a wide product range in excess of 5000 articles, with a constant stock level of approx. 4000 tons of stainless steel and non-ferrous metals.

Since 1898, Notz Metal Ltd has been working with producers and suppliers world-wide as a business and development partner, offering services to customers in the further development of materials and solutions for the metal processing industry, in Switzerland and in neighbouring countries. The recognised high quality sources of high-grade steels ensure that the cooperation between customers, producers, suppliers and Notz Metal Ltd enjoys success and a promising future.

Other products

In several Berylco alloys, we can also offer casting alloys (ingots, master alloy 4 %), but also forging bars, plates, tools... Please contact us!

Application

The Berylco alloys combine a range of properties particularly suited to meeting the exact requirements of many applications in the fields of automobiles, aeronautics, electronics, telephone, domestic appliances, etc.

Very high mechanical properties can be obtained by means of a simple thermal treatment which produces a structural precipitation hardening. Our alloys exhibit many properties such as resistance to fatigue, electrical and thermal conductivity, corrosion- and wear-resistance. They are also non-magnetic and non-sparking.

All manufacturing technologies such as casting, forging, extrusion, cold draw-ing, cold rolling, stamping, machining, soldering, plating, etc., can be used.

The data above is to be referred to by the user in order to select the temper and the alloy which will provide the optimum properties and yet be compatible with the forming of the part. For a given problem we can investigate the possibility of improving the formability while conserving the desired mechanical properties. For these special investigations, NGK Berylco and Notz Metal Ltd offer the services of their engineers and technical advisors.

Industrial hygiene

When supplied in solid form, copper-beryllium alloys are non-hazardous. General handling, stamping, forming, most machining, pickling and plating are non-hazardous. Heat treatment in air up to about 400 °C is non-hazardous. If they are subsequently processed in any way which might give rise to airborne dust or fumes, for instance by dry grinding, abrading, electro-discharge machining, melting or welding, then an inhalation hazard could arise. Any such process requires suitable air extraction and filtration to maintain max. Be level of 2 µg/m³ of air.

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