



Material List
The Global Bronze Expert

INTRODUCTION

Leeds Bronze Engineering Ltd was founded in 1974 and is now a market leader in the stockholding of high-quality bronze material.

Operating from our site in Leeds, West Yorkshire we offer a reliable and efficient service in order to cater to our customer's needs.

Our experienced sales team are on hand to offer advice on our range of leaded, phosphor and aluminium bronzes which are all certified and fully traceable.

In addition to our standard stock range we can supply bespoke castings in either centrifugally or continuously cast condition to any size or volume.

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SAE660/C93200

SAE660 or C93200 is a Leaded (Tin) cast bronze and is a standard in the industry for light/medium bearing applications. Leaded (Tin) Bronze SAE660 or C93200 is suitable for various applications under medium loads. Has good resistance to seawater and brine enabling it to be used in the valve and pump industry.

- Excellent wear resistance
- Easily machinable
- Free cutting
- Good load carrying capacity and thermal conductivity
- Bronze with a high lead content offers good lubricity
- Commonly used in the manufacture of bushes, bearings and wear plates

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	81	83
Sn	Tin	6.3	7.5
Pb	Lead	6.0	8.0
Zn	Zinc	2.0	4.0
Ni	Nickel	-	1.0 ^A
P	Phosphorus	-	0.15 ^B
Al	Aluminium	-	0.005
Fe	Iron	-	0.20
Sb	Antimony	-	0.35
S	Sulphur	-	0.08
Si	Silicon	-	0.005
	Impurities	-	-

^A In determining copper minimum, copper may be calculated as Copper (Cu) + Nickel (Ni).

^B For continuous castings, phosphorus shall be 1.5% maximum.

Mechanical Properties

	<i>Tensile Strength</i>	<i>Proof Strength</i>	<i>Elongation</i>
	N/mm ²	N/mm ²	% min
Continuously Cast (B505)	241	140	10
Centrifugally Cast (B271)	207	97	15

Stock – SAE660/C93200

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1/2	∅	17/32	∅	0.41
5/8	∅	21/32	∅	0.61
3/4	∅	25/32	∅	0.87
7/8	∅	29/32	∅	1.22
1	∅	1 1/32	∅	1.52
1 1/4	∅	1 9/32	∅	2.33
1 1/2	∅	1 17/32	∅	3.35
1 5/8	∅	1 21/32	∅	3.96
1 3/4	∅	1 25/32	∅	4.57
2	∅	2 1/32	∅	5.89
2 1/4	∅	2 9/32	∅	7.41
2 1/2	∅	2 17/32	∅	9.14
2 3/4	∅	2 25/32	∅	11.06
3	∅	3 1/32	∅	13.10
3 1/4	∅	3 9/32	∅	15.30
3 1/2	∅	3 17/32	∅	17.80
3 3/4	∅	3 25/32	∅	23.2
4	∅	4 1/16	∅	29.3
4 1/2	∅	4 9/16	∅	29.70
5	∅	5 1/16	∅	36.50
5 1/2	∅	5 9/16	∅	44.30
6	∅	6 1/16	∅	52.50
6 1/2	∅	6 9/16	∅	61.40
7	∅	7 1/16	∅	71.20
8	∅	8 1/16	∅	92.80
9	∅	9 1/16	∅	117.20
10	∅	10 1/16	∅	144.40

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1	1/2	1 1/32	15/32	1.24
1	3/4	1 1/32	23/32	0.82
1 1/4	1/2	1 9/32	15/32	2.06
1 1/4	3/4	1 9/32	23/32	1.65
1 1/4	1	1 9/32	31/32	1.03
1 1/2	1/2	1 17/32	15/32	3.09
1 1/2	3/4	1 17/32	23/32	2.68
1 1/2	1	1 17/32	31/32	2.06
1 1/2	1 1/4	1 17/32	1 7/32	1.24
1 3/4	3/4	1 25/32	23/32	3.81
1 3/4	1	1 25/32	31/32	3.19
1 3/4	1 1/4	1 25/32	1 7/32	2.47
1 3/4	1 1/2	1 25/32	1 15/32	1.44
2	3/4	2 1/32	23/32	5.25
2	1	2 1/32	31/32	4.64
2	1 1/4	2 1/32	1 7/32	3.81
2	1 1/2	2 1/32	1 15/32	2.88
2 1/4	3/4	2 9/32	23/32	6.80
2 1/4	1	2 9/32	31/32	6.18
2 1/4	1 1/4	2 9/32	1 7/32	5.36
2 1/4	1 1/2	2 9/32	1 15/32	4.43
2 1/4	1 3/4	2 9/32	1 23/32	3.30
2 1/2	1	2 17/32	31/32	7.93
2 1/2	1 1/4	2 17/32	1 7/32	7.21
1/2 2	1 1/2	2 17/32	1 15/32	6.18
2 1/2	1 3/4	2 17/32	1 23/32	5.05
2 1/2	2	2 17/32	1 31/32	3.71
2 3/4	1	2 25/32	31/32	9.89
2 3/4	1 1/4	2 25/32	1 7/32	8.76
2 3/4	1 1/2	2 25/32	1 15/32	8.03
2 3/4	1 3/4	2 25/32	1 23/32	6.90
2 3/4	2	2 25/32	1 31/32	5.56
2 3/4	2 1/4	2 25/32	2 7/32	4.12
3	1	3 1/32	31/32	11.95
3	1 1/4	3 1/32	1 7/32	11.12
3	1 1/2	3 1/32	1 15/32	10.20
3	1 3/4	3 1/32	1 23/32	9.06
3	2	3 1/32	1 31/32	7.73
3	2 1/4	3 1/32	2 7/32	6.18
3	2 1/2	3 1/32	2 15/32	4.43
3 1/4	1 1/2	3 9/32	1 15/32	12.46
3 1/4	1 3/4	3 9/32	1 23/32	11.33
3 1/4	2	3 9/32	1 31/32	9.99
3 1/4	2 1/4	3 9/32	2 7/32	8.45
3 1/4	2 1/2	3 9/32	2 15/32	6.80
3 1/2	1	3 17/32	31/32	16.69
3 1/2	1 1/2	3 17/32	1 15/32	14.94
3 1/2	1 3/4	3 17/32	1 23/32	13.80
3 1/2	2	3 17/32	1 31/32	12.46
3 1/2	2 1/4	3 17/32	2 7/32	10.92
3 1/2	2 1/2	3 17/32	2 15/32	9.27
3 1/2	2 3/4	3 17/32	2 23/32	7.31
3 1/2	3	3 17/32	2 31/32	5.25
3 3/4	2	3 25/32	1 31/32	15.04
3 3/4	2 1/2	3 25/32	2 15/32	11.95
4	1	4 1/16	31/32	22.60

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
4	1 1/2	4 1/16	1 15/32	20.80
4	2	4 1/16	1 31/32	18.20
4	2 1/2	4 1/16	2 15/32	15.00
4	2 3/4	4 1/16	2 23/32	13.20
4	3	4 1/16	2 31/32	11.10
4	3 1/2	4 1/16	3 15/32	6.50
4 1/2	1 1/2	4 9/16	1 15/32	27.00
4 1/2	2	4 9/16	1 31/32	24.50
4 1/2	2 1/2	4 9/16	2 15/32	21.30
4 1/2	3	4 9/16	2 31/32	17.40
4 1/2	3 1/2	4 9/16	3 15/32	12.70
4 3/4	2 1/2	4 13/16	2 15/32	24.70
4 3/4	3 1/2	4 13/16	3 15/32	16.10
4 3/4	4	4 13/16	3 29/32	11.40
5	2	5 1/16	1 31/32	31.52
5	2 1/2	5 1/16	2 15/32	28.33
5	3	5 1/16	2 31/32	24.31
5	3 1/2	5 1/16	3 15/32	19.67
5	4	5 1/16	3 29/32	15.04
5	4 1/2	5 1/16	4 13/32	8.94
5 1/2	2 1/2	5 9/16	2 15/32	35.95
5 1/2	3	5 9/16	2 31/32	32.03
5 1/2	3 1/2	5 9/16	3 15/32	27.40
5 1/2	4	5 9/16	3 29/32	22.66
5 1/2	4 1/2	5 9/16	4 13/32	16.69
6	2	6 1/16	1 31/32	47.59
6	2 1/2	6 1/16	2 15/32	44.39
6	3	6 1/16	2 31/32	40.48
6	3 1/2	6 1/16	3 15/32	35.74
6	4	6 1/16	3 29/32	31.11
6	4 1/2	6 1/16	4 13/32	25.13
6	5	6 1/16	4 29/32	18.33
6 1/2	3 1/2	6 9/16	3 15/32	44.91
6 1/2	4	6 9/16	3 29/32	40.27
6 1/2	4 1/2	6 9/16	4 13/32	34.30
6 1/2	5	6 9/16	4 29/32	27.50
6 1/2	5 1/2	6 9/16	5 13/32	19.93
7	3	7 1/16	2 31/32	59.43
7	4	7 1/16	3 29/32	50.16
7	5	7 1/16	4 29/32	37.39
7 1/2	5 1/2	7 9/16	5 13/32	40.48
8	4	8 1/16	3 29/32	72.10
8	5	8 1/16	4 29/32	59.33
8	6	8 1/16	5 29/32	43.57
8	6 1/2	8 1/16	6 13/32	34.71
9	4	9 1/16	3 29/32	96.72
9	5	9 1/16	4 29/32	84.15
9	6	9 1/16	5 29/32	68.39
9	7	9 1/16	6 29/32	49.85
10	5	10 1/16	4 29/32	111.76
10	6	10 1/16	5 29/32	96.20
10	8	10 1/16	7 29/32	56.14

BS1400 PB1

PB1 is a cast material containing 10–11.5% tin and small amounts of phosphorus. Phosphor Bronze PB1 has high mechanical strength and has good conductivity and wear resistance. Also, with excellent corrosion and fatigue resistance. Phosphor Bronze PB1 can be soldered and brazed.

- Hard wearing bronze containing a small amount of phosphorus
- High fatigue resistance
- High tin content reduces the risk of corrosion
- Phosphorus increases wear resistance
- Commonly used in manufacture of bearings, sleeves, thrust washers and gears

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	–	BAL
Sn	Tin	10.0	11.5
Pb	Lead	–	0.25
Zn	Zinc	–	0.05
Ni	Nickel	–	0.10
P	Phosphorus	0.50	1.0
Al	Aluminium	–	0.01
Fe	Iron	–	0.10
Sb	Antimony	–	0.05
Mn	Manganese	–	0.05
S	Sulphur	–	0.05
Si	Silicon	–	0.02
	Impurities	–	0.60

Mechanical Properties

	<i>Tensile Strength</i>	<i>Proof Strength</i>	<i>Elongation</i>
	N/mm ²	N/mm ²	% min
Continuously Cast	360	170*	6
Centrifugally Cast	330	170*	4
Sand Cast	220	130*	3

*For information only

Stock - BS1400 PB1

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1/2	∅	17/32	∅	0.4
5/8	∅	21/32	∅	0.6
3/4	∅	25/32	∅	0.9
7/8	∅	29/32	∅	1.1
1	∅	1 1/32	∅	1.5
1 1/4	∅	1 9/32	∅	2.3
1 1/2	∅	1 17/32	∅	3.3
1 3/4	∅	1 25/32	∅	4.4
2	∅	2 1/32	∅	5.8
2 1/4	∅	2 9/32	∅	7.2
2 1/2	∅	2 17/32	∅	8.9
2 3/4	∅	2 25/32	∅	10.8
3	∅	3 1/32	∅	12.8
3 1/4	∅	3 9/32	∅	14.9
3 1/2	∅	3 17/32	∅	17.4
4	∅	4 1/16	∅	22.9
4 1/2	∅	4 9/16	∅	28.9
5	∅	5 1/16	∅	35.6
5 1/2	∅	5 9/16	∅	43.0
6	∅	6 1/16	∅	51.1
6 1/2	∅	6 9/16	∅	59.9
7	∅	7 1/16	∅	69.3
8	∅	8 1/16	∅	90.3
9	∅	9 1/16	∅	114.2
10	∅	10 1/16	∅	142.5

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1 1/4	3/4	1 9/32	23/32	1.6
1 1/2	3/4	1 17/32	23/32	2.6
1 1/2	1	1 17/32	31/32	2
1 1/2	1 1/4	1 17/32	1 7/32	1.2
1 3/4	3/4	1 25/32	23/32	3.7
-	1	1 25/32	31/32	3.2
2	1	2 1/32	31/32	4.5
2	1 1/4	2 1/32	1 7/32	3.7
2	1 1/2	2 1/32	1 15/32	2.8
2 1/4	1 1/2	2 9/32	1 15/32	4.3
2 1/2	1	2 17/32	31/32	7.7
2 1/2	1 1/2	2 17/32	1 15/32	6
2 1/2	1 3/4	2 17/32	1 23/32	4.8
2 1/2	2	2 17/32	1 31/32	3.6
2 3/4	1 3/4	2 25/32	1 23/32	6.7
2 3/4	2	2 25/32	1 31/32	5.5
3	1	3 1/32	31/32	11.6
3	1 1/2	3 1/32	1 15/32	9.9
3	1 3/4	3 1/32	1 23/32	8.8
3	2	3 1/32	1 31/32	7.5
3 1/4	1 3/4	3 9/32	1 23/32	11
3 1/4	2	3 9/32	1 31/32	9.7
3 1/4	2 1/2	3 9/32	2 15/32	6.6
3 1/4	2 3/4	3 9/32	2 23/32	4.7
3 1/2	1 1/2	3 17/32	1 15/32	14.5
3 1/2	2	3 17/32	1 31/32	12.2
3 1/2	2 1/2	3 17/32	2 15/32	9.1
3 3/4	2	3 25/32	1 31/32	14.7
3 3/4	2 3/4	3 25/32	2 23/32	9.8
3 3/4	3	3 25/32	2 31/32	7.7
4	1	4 1/16	31/32	21.9
4	1 1/2	4 1/16	1 15/32	20.2
4	2	4 1/16	1 31/32	17.8
4	2 1/2	4 1/16	2 15/32	14.7
4	2 3/4	4 1/16	2 23/32	12.9
4	3	4 1/16	2 31/32	10.8
4 1/2	2	4 9/16	1 31/32	23.9
4 1/2	2 1/2	4 9/16	2 15/32	20.8
4 1/2	3	4 9/16	2 31/32	16.9
4 1/2	3 1/2	4 9/16	3 15/32	12.4
4 1/2	3 3/4	4 9/16	3 23/32	9.9
4 3/4	3 3/4	4 13/16	3 23/32	13.2
5	2	5 1/16	1 31/32	30.7
5	2 1/2	5 1/16	2 15/32	27.6
5	3	5 1/16	2 31/32	23.7
5	3 1/2	5 1/16	3 15/32	19.2
5	4	5 1/16	3 29/32	14.6
5 1/2	3	5 9/16	2 31/32	31.2
5 1/2	3 1/2	5 9/16	3 15/32	26.7
5 1/2	4	5 9/16	3 29/32	22.1
5 1/2	4 1/2	5 9/16	4 13/32	16.3
6	2	6 1/16	1 31/32	47.6
6	2 1/2	6 1/16	2 15/32	43.3
6	3	6 1/16	2 31/32	39.4
6	3 1/2	6 1/16	3 15/32	34.9
6	4	6 1/16	3 29/32	30.3
6	4 1/2	6 1/16	4 13/32	24.4
6	5	6 1/16	4 29/32	17.9

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
6 1/2	3	6 9/16	2 31/32	48.4
6 1/2	4 1/2	6 9/16	4 13/32	32.54
6 1/2	5	6 9/16	4 29/32	26.8
7	3	7 1/16	2 31/32	57.9
7	4	7 1/16	3 29/32	48.8
7	5	7 1/16	4 29/32	36.5
7 1/2	5 1/2	7 9/16	5 13/32	39.4
8	4	8 1/16	3 29/32	70.5
8	5	8 1/16	4 29/32	58.6
8	6	8 1/16	5 29/32	42.5
9	5	9 1/16	4 29/32	80
9	6	9 1/16	5 29/32	67.7
9	7	9 1/16	6 29/32	49.7
10	6	10 1/16	5 29/32	96.5
10	7	10 1/16	6 29/32	78
10	8	10 1/16	7 29/32	58.2
11	8	11 1/16	7 29/32	82.5
12	8	12 1/16	7 29/32	114.5
12	10	12 1/16	9 29/32	65.5

BS2874 CA104

Triple Released to BS B23 1991, EN12163 CW307G R680/R740

CA104 is wrought high strength aluminium bronze, the commonly most used bronze in the market in the UK. Used for its high strength and excellent corrosion resistance to sea water and other aggressive environments aluminium bronze BS2874 CA104 has good wear and abrasive resistance the ability to withstand shock loading.

- Aluminium is the main alloying metal added to copper in contrast to standard bronze (copper/tin)
- Higher strength and corrosion resistance compared to other bronzes
- Resistance to corrosion in seawater
- Material reacts with atmospheric oxygen to create a tough layer of aluminium oxide
- Commonly used in the marine sector, oil and petrochemical industries (non sparking environments)
- Used in the manufacture of valves and fasteners

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	-	BAL
Sn	Tin	-	0.10
Pb	Lead	-	0.05
Zn	Zinc	-	0.40
Ni	Nickel	4.0	5.5
Al	Aluminium	8.5	11.0
Fe	Iron	4.0	5.0
Mn	Manganese	-	0.50
Si	Silicon	-	0.20
	Impurities	-	0.2

Mechanical Properties

Size Range	0.2%PS	UTS	Elongation
Ø mm	N/mm ²	N/mm ²	%
6 – 18mm	400	700	10
18 – 80mm	370	700	12
80mm +	320	680	12

Stock – BS2874 CA104

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1/2	∅	1/2	∅	0.31
5/8	∅	5/8	∅	0.47
3/4	∅	3/4	∅	0.67
7/8	∅	7/8	∅	0.91
1	∅	1	∅	1.2
1 1/8	∅	1 1/8	∅	1.51
1 1/4	∅	1 1/4	∅	1.87
1 3/8	∅	1 3/8	∅	2.25
1 1/2	∅	1 1/2	∅	2.68
1 5/8	∅	1 5/8	∅	3.15
1 3/4	∅	1 3/4	∅	3.61
2	∅	2	∅	4.77
2 1/4	∅	2 1/4	∅	6.04
2 1/2	∅	2 1/2	∅	7.46
2 3/4	∅	2 3/4	∅	9.03
3	∅	3	∅	10.74
3 1/4	∅	3 1/4	∅	12.61
3 1/2	∅	3 1/2	∅	14.6
3 3/4	∅	3 3/4	∅	16.78
4	∅	4	∅	19.09
4 1/4	∅	4 1/4	∅	21.55
4 1/2	∅	4 1/2	∅	24.16
5	∅	5	∅	29.83
5 1/4	∅	5 1/4	∅	33.13
5 1/2	∅	5 1/2	∅	36.13
6	∅	6	∅	42.93
6 1/4	∅	6 1/4	∅	46.61
6 1/2	∅	6 1/2	∅	50.85
6 3/4	∅	6 3/4	∅	54.27
8	∅	8	∅	76.37

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
12mm	∅	12mm	∅	0.26
15mm	∅	15mm	∅	0.43
16mm	∅	16mm	∅	0.48
20mm	∅	20mm	∅	0.74
22mm	∅	22mm	∅	0.9
23mm	∅	23mm	∅	0.98
24mm	∅	24mm	∅	1.06
30mm	∅	30mm	∅	1.68
42mm	∅	42mm	∅	3.25
60mm	∅	60mm	∅	6.65
180mm	∅	180mm	∅	60.06
360mm	∅	360mm	∅	242.67

NES833/Def stan 02-833 Part 2 Issue 4 Grade 1

Aluminium Bronze NES833 DEF-STAN 02-833 is a nickel aluminium bronze similar to CA104 but manufactured to the requirements of the Ministry of Defence. The MOD stipulate a nickel content that exceeds the iron content to improve the general corrosion performance.

Aluminium Bronze NES833 DEF-STAN 02-833 grade has primarily been developed for offshore and marine applications and offers a high strength, an excellent corrosion resistance in seawater and other aggressive media and a high wear and abrasion resistance.

- Aluminium is the main alloying metal added to copper in contrast to standard bronze (copper/tin)
- Higher strength and corrosion resistance compared to other bronzes
- Resistance to corrosion in seawater
- Material reacts with atmospheric oxygen to create a tough layer of aluminium oxide
- Commonly used in the marine sector, oil and petrochemical industries (non sparking environments)
- Used in the manufacture of valves and fasteners

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	-	BAL
Sn	Tin	-	0.10
Pb	Lead	-	0.05
Zn	Zinc	-	0.40
Ni *	Nickel	4.5	5.5
Al	Aluminium	8.5	10.0
Fe *	Iron	4.0	5.00
Mn	Manganese	-	0.50
Si	Silicon	-	0.10
	Impurities	-	0.50

*Nickel content must be greater than iron content

Mechanical Properties

Size Range Ø mm	0.2%PS N/mm ²	UTS N/mm ²	Elongation %	Impact Joules
6 – 15mm	325	680	17	-
15 – 25mm	325	680	17	24
25 – 100mm	295	635	17	27
100mm+ Including Forgings	245	620	15	23

Stock – NES833/Def stan 02-833 Part 2 Issue 4 Grade 1

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1/2	∅	1/2	∅	0.31
5/8	∅	5/8	∅	0.47
3/4	∅	3/4	∅	0.67
7/8	∅	7/8	∅	0.91
1	∅	1	∅	1.2
1 1/8	∅	1 1/8	∅	1.51
1 1/4	∅	1 1/4	∅	1.87
1 3/8	∅	1 3/8	∅	2.25
1 1/2	∅	1 1/2	∅	2.68
1 5/8	∅	1 5/8	∅	3.15
1 3/4	∅	1 3/4	∅	3.65
1 7/8	∅	1 7/8	∅	4.19
2	∅	2	∅	4.77
2 1/4	∅	2 1/4	∅	6.04
2 3/8	∅	2 3/8	∅	6.73
2 1/2	∅	2 1/2	∅	7.46
2 5/8	∅	2 5/8	∅	8.22
2 3/4	∅	2 3/4	∅	9.03
3	∅	3	∅	10.74
3 1/4	∅	3 1/4	∅	12.61
3 3/8	∅	3 3/8	∅	13.59
3 1/2	∅	3 1/2	∅	14.6
3 3/4	∅	3 3/4	∅	16.78
4	∅	4	∅	19.09
4 1/4	∅	4 1/4	∅	21.55
4 1/2	∅	4 1/2	∅	24.16
4 3/4	∅	4 3/4	∅	27.2
5	∅	5	∅	29.83
5 1/4	∅	5 1/4	∅	33.13
5 1/2	∅	5 1/2	∅	36.13
6	∅	6	∅	42.93
6 1/4	∅	6 1/4	∅	46.61
6 1/2	∅	6 1/2	∅	50.85
6 3/4	∅	6 3/4	∅	54.27
7 1/2	∅	7 1/2	∅	67.0
8	∅	8	∅	76.37
10	∅	10	∅	120.17
11 1/4	∅	11 1/4	∅	152.14

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
180mm	∅	180mm	∅	60.06
235mm	∅	235mm	∅	105.56
289mm	∅	289mm	∅	153.97

ASTM B150 C63000 / AMS4640

One of the American grades of nickel aluminium bronze. Aluminium bronze C63000 contains around 10% aluminium, 5% nickel and 3% iron the alloy offers an inherent high strength and hardness combined with a very good toughness and an excellent resistance to wear, shock and abrasion.

Offers very good corrosion and erosion and cavitation resistance in seawater and non-oxidising acids. It also has a very good galling resistance and offers a high retention of mechanical properties at elevated temperatures making this ideal for aerospace applications. Used typically in the Oil and Gas and Marine environments.

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	-	BAL
Sn	Tin	-	0.1
Zn	Zinc	-	0.3
Ni + Co	Nickel + Cobalt	4.0	5.5
Al	Aluminium	9.0	11.0
Fe	Iron	3.0	4.0
Mn	Manganese	-	1.0
Si	Silicon	-	0.20
Pb	Lead	-	0.05

Mechanical Properties

Size Range	0.2%PS	UTS	Elongation
Ø mm	N/mm ²	N/mm ²	%
12 – 25mm	469	758	10
26 – 50mm	414	758	10
51 – 76mm	379	724	10
77mm – 127mm	345	689	10

Stock - ASTM B150 C63000/AMS4640

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1/2	∅	1/2	∅	0.31
5/8	∅	5/8	∅	0.47
3/4	∅	3/4	∅	0.67
7/8	∅	7/8	∅	0.91
1	∅	1	∅	1.2
1 1/8	∅	1 1/8	∅	1.51
1 1/4	∅	1 1/4	∅	1.87
1 1/2	∅	1 1/2	∅	2.68
1 5/8	∅	1 5/8	∅	3.15
1 3/4	∅	1 3/4	∅	3.61
2	∅	2	∅	4.77
2 1/4	∅	2 1/4	∅	6.04
2 1/2	∅	2 1/2	∅	7.46
2 3/4	∅	2 3/4	∅	9.03
3	∅	3	∅	10.74
3 1/4	∅	3 1/4	∅	12.61
3 1/2	∅	3 1/2	∅	14.6
4	∅	4	∅	19.09
4 1/4	∅	4 1/4	∅	21.78
4 1/2	∅	4 1/2	∅	24.16
5	∅	5	∅	29.83
5 1/4	∅	5 1/4	∅	33.24
6	∅	6	∅	42.93
6 1/2	∅	6 1/2	∅	50.94
8 1/8	∅	8 1/8	∅	79.59
10	∅	10	∅	120.56

ASTM B150 C63200

Aluminium bronze C63200 is a strong, corrosion resistant material that performs well at high and low temperatures. It also has a low magnetic permeability, making it ideal for use on instrumentation systems, seawater piping systems and marine propulsion units.

- Aluminium is the main alloying metal added to copper in contrast to standard bronze (copper/tin)
- Higher strength and corrosion resistance compared to other bronzes
- Resistance to corrosion in seawater
- Material reacts with atmospheric oxygen to create a tough layer of aluminium oxide
- Commonly used in the marine sector, oil and petrochemical industries (non sparking environments)
- Used in the manufacture of valves and fasteners

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	–	BAL
Sn	Tin	–	–
Zn	Zinc	–	–
Ni + Co	Nickel + Cobalt	4.0	4.8
Al	Aluminium	8.7	9.5
Fe	Iron	3.5	4.3
Mn	Manganese	1.2	2.0
Si	Silicon	–	0.10
Pb	Lead	–	0.02

Mechanical Properties

Size Range	0.2%PS	UTS	Elongation
Ø mm	N/mm ² Min	N/mm ² Min	% Min
Up to 3 inch	345	620	15
3 to 5 inch	310	620	15
5 – 12 inch	275	620	15

Stock - B150 C63200

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1/2	∅	1/2	∅	0.31
5/8	∅	5/8	∅	0.47
3/4	∅	3/4	∅	0.67
7/8	∅	7/8	∅	0.91
1	∅	1	∅	1.2
1 1/4	∅	1 1/4	∅	1.87
1 3/8	∅	1 3/8	∅	2.25
1 1/2	∅	1 1/2	∅	2.68
1 5/8	∅	1 5/8	∅	3.15
1 3/4	∅	1 3/4	∅	3.61
1 7/8	∅	1 7/8	∅	4.18
2	∅	2	∅	4.77
2 1/8	∅	2 1/8	∅	5.36
2 1/4	∅	2 1/4	∅	6.04
2 3/8	∅	2 3/8	∅	6.70
2 1/2	∅	2 1/2	∅	7.46
2 3/4	∅	2 3/4	∅	9.03
3	∅	3	∅	10.74
3 1/2	∅	3 1/2	∅	14.60
3 3/8	∅	3 3/8	∅	13.53
4	∅	4	∅	19.09
4 1/2	∅	4 1/2	∅	24.16
5 3/4	∅	5 3/4	∅	39.27

BS1400 LB2

Leaded Bronze with 10% lead and 10% tin.

- Excellent machining properties.
- Excellent wear resistance under high speed and moderate load.
- Low friction and used in areas where lubrication is less than adequate.

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	–	BAL
Sn	Tin	9	11
Pb	Lead	8.5	11
Zn	Zinc	–	1
Ni	Nickel	–	2
P	Phosphorus	–	0.10
Al	Aluminium	–	0.01
Fe	Iron	–	0.15
Sb	Antimony	–	0.5
Mn	Manganese	–	0.20
S	Sulphur	–	0.1
Si	Silicon	–	0.02
	Impurities	–	0.50

Mechanical Properties

Size Range	0.2%PS	UTS	Elongation
Ø mm	N/mm ² Min	N/mm ² Min	% Min
Continuously Cast (B505)	280	160	6
Centrifugally Cast (B271)	230	140	5
Sand	190	80	5

Stock – BS1400 LB2

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
3	∅	3 1/32	∅	13.20
4	∅	4 1/16	∅	23.55
5	∅	5 1/16	∅	36.53
5	2	5 1/16	1 31/32	31.52
6	4	6 1/16	3 29/32	39.35

BS1400 LB4

Leaded Bronze with 9% lead and 5% tin.

- Excellent machining properties.
- Suitable for low to moderate loads.
- Low friction and used in areas where a lack of lubrication is possible for short periods of time.

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	–	BAL
Sn	Tin	4	6
Pb	Lead	8	10
Zn	Zinc	–	2
Ni	Nickel	–	2
P	Phosphorus	–	0.10
Al	Aluminium	–	0.01
Fe	Iron	–	0.25
Sb	Antimony	–	0.5
Mn	Manganese	–	0.2
S	Sulphur	–	0.1
Si	Silicon	–	0.02
	Impurities	–	0.50

Mechanical Properties

	<i>Tensile Strength</i>	<i>Proof Strength</i>	<i>Elongation</i>
	N/mm ²	N/mm ²	% min
Continuously Cast (B505)	230	130	9
Centrifugally Cast (B271)	220	80	6
Sand	160	60	7
Chill	200	80	5

Stock – BS1400 LB4

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
1 1/2	∅	1 17/32	∅	3.35
2	∅	2 1/31	∅	5.89
2 1/2	∅	2 17/32	∅	9.14
3	∅	3 1/31	∅	13.09
3 1/2	∅	3 17/32	∅	17.86
4	∅	4 1/16	∅	23.55
6	∅	6 1/16	∅	52.39
6	2	6 1/16	1 31/32	46.87
6	3	6 1/16	2 31/32	39.89
6	4	6 1/16	3 29/32	30.75
10	∅	10 1/16	∅	144.33

BS1400 PB2

PB2 has a higher tin content than PB1 which gives an excellent resistance to wear.

- Hard wearing bronze containing a small amount of phosphorus
- High tin content reduces the risk of corrosion
- Phosphorus increases wear resistance
- Commonly used in manufacture of bearings, sleeves, thrust washers and gears

Chemical Composition

		Min (%)	Max (%)
Cu	Copper	–	BAL
Sn	Tin	11.0	13.0
Pb	Lead	–	0.50
Zn	Zinc	–	0.30
Ni	Nickel	–	0.50
P	Phosphorus	0.15	0.60
Al	Aluminium	–	0.01
Fe	Iron	–	0.10
Sb	Antimony	–	–
Mn	Manganese	–	–
S	Sulphur	–	0.10
Si	Silicon	–	0.02
	Impurities	–	0.20

Mechanical Properties

	<i>Tensile Strength</i>	<i>Proof Strength</i>	<i>Elongation</i>
	N/mm ²	N/mm ²	% min
Continuously Cast	310	170*	5
Centrifugally Cast	280	170*	3
Sand Cast	220	130*	5

Stock – BS1400 PB2

FINISHED SIZE		SUPPLIED SIZE		
O/D (inch)	I/D (inch)	O/D (inch)	I/D (inch)	KGS/FT
2 1/2	∅	2 17/32	∅	8.93
3 1/2	∅	3 17/32	∅	17.36
4 9/16	∅	4 5/8	∅	29.84
5 9/16	∅	5 5/8	∅	44.15

Related Alloy Designations for Copper Alloys

British		European		German		American	
BS		EN 1982:2008 – 08		DIN		ASTM	
Designation	Composition	Designation	Designation	UNS	SAE		
Copper – Tin							
PB1	CuSn11P–C	CC481K		C90710	SAE65		
PB2	CuSn11P–C	CC483K	CuSn12	C90800	SAE65		
PB4	CuSn10PbP	CC480K	CuSn10	C92700	SAE65		
CT2	CuSn12Ni	CC484K		C91700	SAE640		
LPB1	CuSn7PbP		CuSn8Pb4Zn1	C93100			
Copper – Tin – Lead							
LG1	CuSn3Pb5Zn8	CC490K	CuSn3ZnPb	C84400	SAE40		
LG2	CuSn5Pb5Zn5	CC491K	CuSn5ZnPb	C83600	SAE40/SAE J462		
LG3	CuSn7Pb4Zn2			C92200			
LG4	CuSn7Pb3Zn3	CC492K	CuSn7ZnPb	C93400 / C92410	SAE J461		
G1	CuSn10Zn2		CuSn10Zn2	C90500	SAE62		
G2	CuSn8Zn4Pb			C92610			
G3	CuSn7Ni5Zn3			C94800			
LB1	CuPb15Sn9	CC496K	CuPb15Sn	C93800 / C93900	SAE67		
LB2	CuSn10Pb10	CC495K	CuPb10Sn	C93700	SAE64 / SAE797		
LB4	CuSn5Pb9	CC494K		C93500	SAE66		
LB5	CuPb20Sn5	CC497K	CuPb20Sn	C94100	SAE794 / SAE799		
		CC493K	CuSn7ZnPb (Rg7)	C93200	SAE660		
Copper – Aluminium							
AB1	CuAl10Fe3	CC331G	CuAl10Fe	C95210 / C95400	SAE68		
AB2	CuAl10Fe5Ni5	CC333G	CuAl10Ni	C95810 / C95800	SAE68B / SAE630		
CA101	CuAl5		CuAl5	C60600			
CA102	CuAl6Ni2			C61550 / C61000	AMS4631		
CA103	CuAl10Fe	CW306G	CuAl10Fe3Mn2	C62300 / C62500	AMS4635		
CA104	CuAl10Ni5Fe4	CW307G	CuAl10Ni5Fe4	C63000 / C63200	AMS4640		
CA105	CuAl9Ni6Fe3		CuAl9Ni6Fe3	C63000 / C63020	AMS4640 / 4590		
CA106	CuAl8Fe3	CW303G	CuAl8Fe	C61400			
B23	CuAl10Ni5Fe4	CW307G	CuAl10Ni5Fe4	C63000 / C63200	AMS4640		
Copper – Zinc							
HTB1	CuZn35AlFeMn	CC765S	CuZn35Al1	C86500	SAE43		
HTB2	CuZn36Al4FeMn	CC764S	CuZn34Al2		SAE430A / Alloy423		
HTB3	CuZn28Al5FeMn	CC762S	CuZn25Al5	C86300	SAE430B / Alloy424		
DCB1	CuZn38	CC767S	CuZn38Al	C85700			
DCB3	CuZn37Pb	CC754S	CuZn37Pb	C85710			
Copper – Nickel							
CN1	CuNi30Cr	CC382H					
CN2	CuNi30Nb	CC383H					
		CC380H	CuNi10	C96200			

Related Alloy Designations for Copper Alloys

British	Europe	German	American	
			UNS	SAE
Marine Aluminium Bronze				
NES833 (Def-Stan 02-833)	CuAl10Ni5Fe4	DIN17665 CuAl10Ni5Fe4	C63200	
NES834 (Def-Stan 02-834)	CuAl7Si2		C64200	
NES835 (Def-Stan 02-835)	CuNi14Mn4Al2Fe			
NES747 (Def-Stan 02-747)	CuAl10Fe5Ni5	DIN1714 CuAl10Ni	C95500	SAE68B
NES779 (Def-Stan 02-779)	CuNi 90/10	DIN17664 CuNi10Fe	C70600	
NES780 (Def-Stan 02-780)	CuNi 70/30	DIN17664 CuNi30Fe	C71500	
NES830 (Def-Stan 02-830)	CuSn7Zn2Pb3	DIN1705 CuSn7ZnPb	C93400 / C92410	SAE J461



supplying the world over

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