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WHITE METAL BEARING ALLOYS (BABBITT METAL)

SELECTION OF A BEARING ALLOY

In selecting the proper type of Babbitt for a particular job there are a number of factors to take into consideration, the most import of which are as follows:

1. ***Surface speed of the SHAFT***
2. ***Load bearing is required to carry***

Secondly, but no less important, the following points must also be taken into account:

- ***A. Continuity of service***
- ***B. Bonding possibilities***
- ***C. Cooling facilities***
- ***D. Lubrication***
- ***E. Cleanliness***
- ***F. Attention given to the bearings in question***

There is no doubt that if a bearing be highly loaded in relation to its size, a high tin alloy is desirable; whereas for much slower speed work and less heavily loaded bearings, a lead-base one may be employed, and is far more economical.

1. Surface speed of the shaft: (The number of feet traveled per minute by the shaft circumferentially.

Formula: $\frac{Pi \times D \times RPM}{12} = S$

Pi = 3.1416
D = Diameter of Shaft
RPM = Revolutions Pe Minute
S = Surface sped of the Shaft

Example: **Determine the surface of a 2 inch diameter shaft going 1,400 RPM**

$\frac{Pi \times D \times RPM}{12} = \frac{3.1416 \times 2 \times 1{,}400}{12} =$ **733.04 Ft/min**

2. Load Bearing is required to carry: (The weight which is being exerted through the combined weights of the shaft and any other direct weights on the shaft and measured in pounds per square inch.)

Formula: $\frac{W}{I.D \times L.O.B.} = L$

W = Total weight carried by bearing
I.D = Inside diameter of bearing
L = Load bearing required to carry
L.O.B = Length of Bearing

Example: **Determine the load on a bearing of a 2 inch I.D bearing, 5 inches long and carrying a weight of 3,100 Lbs**

$\frac{W}{I.D \times L.O.B.} = \frac{3{,}100}{2 \times 5} =$ **310 Lbs/sq. in**

There are many formulas for standard grade babbitts but they fall into two main classification:

Babbitt Classification	LIMITS			
	Surface Speeds (# of Ft/min)		LOAD (Lbs/sq. in.)	
	MIN.	MAX.	MIN.	MAX.
Tin-Based Babbitts	1,000	2,400	100	2,000
Lead Based Babbitts	100	1,000	100	500

Issue Date:4/5/01

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WHITE METAL BEARING ALLOYS (BABBITT METAL)

TIN BASED ALLOYS

CHEMICAL COMPOSITION (%) CHART

INDUSTRY NAME	ASTM B23	Sn (Tin)	Sb (Antimony)	Cu (Copper)	Pb (Lead)
Marine 11 D	-	90.0 - 92.0	4.5 - 5.5	3.5 - 4.5	*0.35 (Max)*
No. 1	Grade 1	90.0 - 92.0	4.0 - 5.0	4.0 - 5.0	*0.35 (Max)*
Marine 11 R	-	89.0 - 89.5	7.5 - 8.5	2.5 - 3.0	*0.35 (Max)*
Nickel Genuine	Grade 2	88.0 - 90.0	7.0 - 8.0	3.0 - 4.0	*0.35 (Max)*
Marine 11	-	88.0 - 90.0	5.5 - 6.0	5.0 - 5.5	*0.35 (Max)*
4X Royal Nickel Genuine	-	87.5 - 89.5	7.25 - 7.75	3.25 - 3.75	*0.35 (Max)*
Diesel Special	-	87.5 - 88.0	6.5 - 7.0	5.0 - 6.0	*0.35 (Max)*
No. 11	Grade 11	86.0 - 89.0	6.0 - 7.5	5.0 - 6.5	*0.35 (Max)*
SAE 11	-	85.0 - 87.0	7.0 - 8.0	6.0 - 7.0	*0.35 (Max)*
Imperial Genuine	-	85.0 - 87.0	6.5 - 7.5	6.5 - 7.5	*0.35 (Max)*
Turbine	-	84.0 - 86.0	6.5 - 7.5	7.5 - 8.5	*0.35 (Max)*
Royal Armature	-	83.5 - 84.0	8.0 - 8.5	7.5 - 8.5	*0.35 (Max)*
Super Tough	Grade 3	83.0 - 85.0	7.5 - 8.5	7.5 - 8.5	*0.35 (Max)*

Maximum Allowable Impurities: Fe=0.08, As=0.10, Bi=0.08, Zn=0.005, Al=0.005, Cd=0.05

LEAD BASED ALLOYS

CHEMICAL COMPOSITION (%) CHART

INDUSTRY NAME	ASTM B23	Sn (Tin)	Sb (Antimony)	Pb (Lead)	As (Arsenic)
No. 13	Grade 13	5.5 - 6.5	9.5 - 10.5	Balance	*0.25 (Max)*
Mill Anchor	-	4.0 - 6.0	11.5 - 12.5	Balance	*0.25 (Max)*
Durite	Grade 15	0.8 - 1.2	14.5 - 17.5	Balance	0.8 - 1.4
Star	-	5.0 - 5.5	13.5 - 14.5	Balance	0.30 - 0.60
Silvertone	-	1.0 - 3.0	17.5 - 18.5	Balance	*0.25 (Max)*
Royal	Grade 8	4.5 - 5.5	14.0 - 16.0	Balance	0.30 - 0.60
Heavy Pressure	Grade 7	9.3 - 10.7	14.0 - 16.0	Balance	0.30 - 0.60
Special Sawguide	-	9.0 - 11.0	18.5 - 19.5	Balance	*0.25 (Max)*

Maximum Allowable Impurities: Cu=0.50, Fe=0.10, Bi=0.10, Zn=0.005, Al=0.005, Cd=0.05

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