

Oil-impregnated sintered bearings are manufactured under strictly controlled conditions, and are subjected to in-process inspection. They are tested for radial crushing strength of magnitude:

$$P = \frac{K L T^2}{D - T} \quad (\text{lbs})$$

where:

- D = O.D. of bearing (in)
- T = wall thickness of bearing (in)
- L = bearing length (in)
- K = strength constant = 22500

Should additional shaft to bearing clearance be required, a ball burnishing operation should be used for the following reasons:

- a) to maintain concentricity
- b) to maintain surface finish of I.D.
- c) to reduce contamination of surface

The required size of the bearing can be determined from equations:

- 1) $P = \frac{W}{L d}$ (lbs/in²) (load on projected bearing areas not to exceed 1000 psi)
- 2) $V = \frac{d \pi N}{12}$ (ft/min) (surface speed at bearing I.D. not to exceed 1000 ft/min)
- 3) $PV = \frac{W N \pi}{12L}$ (PV factor – not to exceed 50000)

where:

- W = bearing load (lbs)
- L = bearing length (in)
- N = shaft speed (rpm)
- d = bearing I.D. (in)

Above values are reasonable for the following conditions: continuous rotation, oil impregnation without additional lubrication.

2.5 Standardization

American Society for Testing of Materials (ASTM, 100 Ban-Harbor Drive, W. Conchohocken, PA 19428, Tel. 610-832-9500) publishes detailed specifications dealing with Sintered Bronze Bearings. It is designated as B438-83 (published in 1983). The most significant data pertaining to products listed in this catalog can be summarized as follows:

Table 2-5 Material Composition

Material	%
Copper	87.5 – 90.5
Iron	1.0 Max.
Lead	(a)
Carbon (Graphite Max.)	1.75 Max.
Tin	9.5 – 10.5
Zinc	—
Acid Insolubles	—
Total Other Elements	0.5

(a) included in other elements

Table 2-6 Physical & Mechanical Properties

Characteristic	Value
Density (g/cm ³)	6.4 – 6.8
Porosity (% by volume)	19 min.
“K” Strength Constant	26500
Tensile Strength (psi)	14000
Elongation (% per in)	1
Yield Strength in Compression (psi)	11000

Table 2-7 Miscellaneous Designations

Organization	Designation
ASTM	B-438-83 Grade 1, Type 2
Military	MIL-B-5687D Type 1, Grade 1
MPIF Standard 35	CT-1000-K26
SAE	
New	841
Old	Type 1 Class A
AMS	4805

Table 2-8 Tolerances of Plain and Flanged Bearings


	Over (in)	Up to & Including	Tolerance
Inside & Outside Diameters (in)	—	1/2	+ .000 – .001
	1/2	1	+ .000 – .001
	1	1-1/2	+ .000 – .001
	1-1/2	2-1/2	+ .000 – .0015
	2-1/2	3-1/2	+ .000 – .002
	3-1/2	4-1/2	+ .000 – .0025
Length (in)	—	1-1/2	± .005
	1-1/2	3	± .0075
	3	4-1/2	± .010
Flange Diameter, Based on Flange OD	—	1-1/4	± .005
	1-1/4	2-1/2	± .010
	2-1/2	4	± .015
	4	4-1/2	± .025
Flange Thickness, Based on Flange OD	—	1-1/4	± .0025
	1-1/4	2-1/2	± .005
Flange Fillets, Radii, Based on Body OD	—	1	1/32 ± .010
	1	2	3/64 ± .010
	2	2-1/2	1/16 ± .010
	2-1/2	4	3/32 ± 1/64
Concentricity, ID with Respect to OD (Maximum Total Dial Indicator Reading) Based on ID	—	1	.003
	1	1-1/2	.003
	1-1/2	3	.004
	3	4-1/2	.005