



Standard Specification for Iron Bronze Sintered Bearings (Oil-Impregnated)¹

This standard is issued under the fixed designation B 612; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers iron-copper-tin-graphite sintered metal powder oil-impregnated bearings of one composition commonly known as diluted bronze.

1.2 The following safety hazards caveat pertains only to the test method described in this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

B 328 Test Method for Density, Oil Content, and Interconnected Porosity of Sintered Powder Metal Structural Parts and Oil-Impregnated Bearings²

E 9 Test Methods of Compression Testing of Metallic Materials at Room Temperature³

3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

3.1.1 Dimensions and

3.1.2 Certification (12.1).

4. Materials and Manufacture

4.1 Bearings shall be made by briquetting and sintering metal powders with an addition of graphite so as to produce finished parts conforming to the requirements of this specification.

5. Chemical Composition

5.1 The material shall conform to the requirements as to chemical composition prescribed in Table 1.

¹ This specification is under the jurisdiction of ASTM Committee B-9 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.04 on Bearings.

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² Annual Book of ASTM Standards, Vol 02.05.

³ Annual Book of ASTM Standards, Vol 03.01.

TABLE 1 Chemical Requirements

Element	Composition, %
Iron	54.2–62.0
Copper	34.0–38.0
Tin	3.5–4.5
Total carbon	0.5–1.3
Combined carbon ^a	0.5 max
Total other elements	2.0 max

^aOn basis of iron.

6. Physical Properties

6.1 *Density*—The density of bearings supplied fully impregnated with lubricant shall be 6.0 to 6.4 g/cm³.

6.2 *Oil Content*—Oil content of bearings shall not be less than 17 % when determined in accordance with Test Method B 328.

6.3 *Radial Crushing Strength*—Radial crushing strength determined as prescribed in 9.2 shall be not less than nor greater than the calculated value limits using the minimum and maximum *K* values given below and using the following equation:

$$P = KLT^2/(D - T) \quad (1)$$

where:

P = radial crushing strength (Note), lbs (or N);

D = outside diameter of bearing, in. (or mm);

T = wall thickness of bearing, in. (or mm);

L = length thickness of bearing, in. (or mm); and

K = strength constant with *K*_{min} = 22 000 psi (152 MPa) and *K*_{max} = 50 000 psi (345 MPa).

NOTE 1—Strengths above the maximum value indicate high combined carbon, which has a deleterious effect on bearing performance.

7. Workmanship, Finish, and Appearance

7.1 Bearings shall be uniform in composition. When cut or fractured, the exposed surface shall be of uniform appearance. The parts shall be free of defects which would affect their serviceability. Upon metallographic examination, the microstructure of the material shall be iron dispersed through a matrix of substantially alpha bronze and containing no free tin visible at 300×. To check for uniform permeability, the part shall be observed either while it is being heated or while the inside of the bearing is being subjected to air pressure. Oil shall exude uniformly from all critical surfaces.