



Standard Specification for Car and Tender Journal Bearings, Lined¹

This standard is issued under the fixed designation B67; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification covers the establishment of requirements for lined journal bearings for use on locomotive tenders, passenger cars, and freight equipment cars. The alloy specified is UNS No. C94100.²

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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:*³

B824 Specification for General Requirements for Copper Alloy Castings

E57 Methods for Chemical Analysis of White Metal Bearing Alloys (Withdrawn 1986)⁴

E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

¹ This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.05 on Castings and Ingots for Remelting.

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² The UNS system for copper and copper alloys (see Practice E527) is a simple expansion of the former standard designation system accomplished by the addition of a prefix “C” and a suffix “00.” The suffix can be used to accommodate composition variations of the base alloy.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

3. General Requirements

3.1 The following sections of Specification B824 constitute a part of this specification:

3.1.1 Terminology (Section 3).

3.1.2 Sampling (Section 10).

3.1.3 Number of Tests and Retests (Section 11).

3.1.4 Specimen Preparation (Section 12).

3.1.5 Test Methods (Section 13).

3.1.6 Significance of Numerical Limits (Section 14).

3.1.7 Inspection (Section 15).

3.1.8 Rejection and Rehearing (Section 16).

3.1.9 Certification (Section 17).

3.1.10 Test Report (Section 18).

3.1.11 Product Marking (Section 19).

3.1.12 Supplementary Requirements (S1–S4).

4. Ordering Information

4.1 Include the following information when placing orders for bearings under this specification as applicable:

4.1.1 Quantity of bearings required,

4.1.2 ASTM designation and year of issue (for example, B67 – 05),

4.1.3 Pattern and drawing number and condition (as cast, machined, and so forth),

4.1.4 Chemical analysis of residual elements, if specified in the purchase order (Section 6),

4.1.5 Fracture testing (Section 8),

4.1.6 Witness inspection (Specification B824), and

4.1.7 Product marking (Section 13).

5. Materials and Manufacture

5.1 Before lining, the brass backs shall be bored and thoroughly tinned in accordance with the best standard practice. After lining, the ends of the bearings shall be made smooth by scraping, filing, or machining. They shall not be ground or rubbed with abrasive materials.

5.2 The purchaser reserves the right to inspect the brass backs after boring and previous to tinning and lining.

5.3 Unless otherwise specified, bearings will be furnished with linings ¼ in. (6.35 mm) in thickness.

*A Summary of Changes section appears at the end of this standard

TABLE 1 Chemical Composition of Backing, Copper Alloy

Copper Alloy UNS No.	Composition, % max, except as indicated										
	Copper	Tin	Lead	Zinc	Iron	Nickel, including Cobalt	Aluminum	Antimony	Sulfur	Phosphorus	Silicon
C94100	72.0–79.0 ^A	4.5–6.5	18.0–22.0	1.0	0.25	1.0	0.005	0.8	0.08 ^B	0.50 ^C	0.005

^A Copper + Sum of Named Elements, 98.7 %.

^B For continuous castings, Sulfur shall be 0.25 % maximum.

^C For continuous castings, Phosphorus shall be 1.5 % maximum.

5.4 The bearings shall be sound and free of blowholes, dross, and mechanical defects. All bearing surfaces, including ends, before and after lining, shall be smooth finished and free from sand.

6. Chemical Composition of Backing

6.1 The backing metal shall conform to the requirements for named elements shown in [Table 1](#) for Copper Alloy UNS No. C94100.

6.2 These specification limits do not preclude the presence of other elements. Limits may be established for unnamed elements by agreement between manufacturer or supplier and purchaser. Copper or zinc may be given as remainder and may be taken as the difference between the sum of all elements analyzed and 100 %. When all named elements in [Table 1](#) are analyzed, their sum shall be 98.7 % minimum.

6.3 It is recognized that residual elements may be present in cast copper-base alloys. Analysis shall be made for residual elements only when specified in the purchase order (Specification [B824](#)).

6.4 Sampling will be in accordance with the requirements of Practice [E255](#).

7. Chemical Composition of Lining

7.1 The lining metal shall conform to the requirements for named elements in [Table 2](#).

8. Examination of Fracture

8.1 The finished bearing representing a lot for acceptance shall be broken, either longitudinally or transversely, or both, in order to ascertain the uniformity of the grain of the metal.

When this fracture shows separation, imperfect mixing of component parts, or dross or dirt spots, the lot shall be rejected.

9. Dimensions and Permissible Variations

9.1 The purchaser shall furnish drawings showing the dimensions of the bearings ordered and permissible variations therefrom, and the bearings shall conform to these drawings within such permissible variations.

9.2 The thickness at the center of the brass and of the complete bearing shall not vary more than $\frac{1}{32}$ in. (0.794 mm) over or under the normal thickness shown on the drawing. The thickness of the lining shall not vary more than $\frac{1}{32}$ in. over or under the normal thickness shown on the drawing.

10. Casting Repair

10.1 The castings shall not be repair welded.

11. Sampling

11.1 Bearings shall be divided into lots of 300, or fraction thereof, and one bearing shall be taken from each lot for the purpose of fracture testing and product marking.

12. Test Methods

12.1 Chemical analysis of the lining shall be made in accordance with Methods [E57](#).

13. Product Marking

13.1 The name or initials of the manufacturer, the initials of the purchaser, size of journal bearing, pattern number, and year cast shall be legibly cast with raised figures on a depressed surface of each bearing, as shown on the drawings. When a serial number is specified, each lot of 300 bearings, or fraction thereof, shall bear the same serial number, commencing with the numeral one at the beginning of the year and continuing consecutively until the end of the year, at each manufacturer's plant.

14. Keywords

14.1 bronze castings; journal bearings

TABLE 2 Chemical Requirements of Lining

Tin, %	as specified
Antimony, min, %	8.0
Tin and antimony, %	10.0–14.0
Arsenic, max, %	0.2
Copper, max, %	0.5
Sum of tin, antimony, lead and arsenic, min, %	99.25
Other impurities, max, %	0.75

SUMMARY OF CHANGES

Committee B05 has identified the location of selected changes to this standard since the last issue (B67 – 05(2011)) that may impact the use of this standard. (Approved April 1, 2014.)

(1) Revised **Table 1**.

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