



Designation: B427 – 09

Standard Specification for Gear Bronze Alloy Castings¹

This standard is issued under the fixed designation B427; 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 specification² establishes requirements for alloys whose copper alloy numbers and nominal compositions are shown in **Table 1**. The castings may be furnished as one of three types: static chill, centrifugal chill, or sand cast.

1.2 The values stated in inch-pound units are to be regarded as the standard. SI values given in parentheses are for information purposes only.

2. Referenced Documents

2.1 ASTM Standards:³

B208 Practice for Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal, and Continuous Castings

B824 Specification for General Requirements for Copper Alloy Castings

B846 Terminology for Copper and Copper Alloys

B950 Guide for Editorial Procedures and Form of Product Specifications for Copper and Copper Alloys

E8 Test Methods for Tension Testing of Metallic Materials

E10 Test Method for Brinell Hardness of Metallic Materials

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

3. General Requirements

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

3.1.1 Terminology

3.1.2 Materials and Manufacture

3.1.3 Sampling

3.1.4 Number of Tests and Retests

3.1.5 Specimen Preparation

3.1.6 Certification

3.1.7 Test Reports

3.2 In addition, when a section with a title identical to that referenced in **3.1**, above, appears in this specification, it contains additional requirements which supplement those appearing in Specification **B846**.

4. Terminology

4.1 For definitions of terms related to copper and copper alloys, refer to Terminology **B846**.

5. Ordering Information

5.1 Include the following information when placing orders for product under this specification:

5.1.1 Quantity of castings required,

5.1.2 Copper Alloy UNS No. (**Table 1**),

5.1.3 Specification title, number, and year of issue,

5.1.4 Pattern or drawing number and casting type (Section **1**),

5.1.5 Repair of castings (Section **9**),

5.1.6 Certification, if specified in the purchase order (Specification **B824**),

5.1.7 Foundry test report, if specified in the purchase order (Specification **B824**), and

5.1.8 Witness inspection, if specified in the purchase order (Specification **B824**).

5.2 When product is purchased for agencies of the U.S. Government, the Supplementary Requirements of Specification **B824** may be specified.

6. Chemical Composition

6.1 The castings shall conform to the requirements as to chemical composition requirements prescribed in **Table 2** for the alloy specified.

6.2 These specification limits do not preclude the presence of other elements. Limits may be established by agreement between manufacturer or supplier and purchaser for these unnamed elements. Copper may be given as remainder and

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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.

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

TABLE 1 Nominal Composition

Copper Alloy UNS No.	Previously Used Designation	Composition, %				
		Copper	Tin	Nickel	Lead	Phosphorus
C90800	A	87.8	12.0	...	0	0.2
C91700	B	86.3	12.0	1.5	0	0.2
C90700	...	87.8	11.0	...	0	0.2
C91600	C	88.0	10.3	1.5	0	0.2
C92900	D	83.5	10.0	3.5	2.8	0.2

may be taken as the difference between the sum of all elements analyzed and 100 %. When all the named elements in **Table 2** are analyzed, their sum shall be as specified in **Table 3**.

7. Mechanical Property Requirements

7.1 Mechanical properties shall be determined from separately cast test bar castings and shall meet the requirements shown in **Table 4**.

8. Dimensions, Mass, and Permissible Variations

8.1 Variations in dimensions and weights shall be as agreed upon between the producer and the consumer but shall not be more than 3 % in the as-cast condition.

8.2 The manufacturer shall not be responsible for the dimensional accuracy of patterns or molds furnished by the purchaser.

9. Casting Repair

9.1 The castings shall not be repaired, plugged, welded, or burned-in without the written approval of the purchaser.

10. Sampling

10.1 Test bar casting representing sand castings in the Copper Alloy UNS Nos. under this specification shall be cast to the form and dimensions shown in Figs. 2, Figs. 3, or Figs. 4 of Practice **B208**.

10.2 Test bar castings representing castings produced in chill molds of metal or graphite may be cast in open keel-block molds of the same material as the molds used for the castings.

10.3 Separate centrifugally cast test bars shall be made in accordance with Practice **B208**.

10.4 At the manufacturer's option test bar specimens may be removed from centrifugal castings instead of separate centrifugally cast test coupons (**10.3**).

11. Number of Tests

11.1 One Brinell hardness reading shall be made for each lot of castings.

12. Test Methods

12.1 Brinell readings shall be taken on the grip end of the tension test bar, at or within 1 in. (25.4 mm) of the casting outside diameter, or as indicated on the purchaser's drawing and shall be made in accordance with Test Method **E10**.

13. Certification

13.1 In the case of a product manufactured in advance and supplied for sale from stock by the manufacturer, jobber or other dealer, the product may upon request of the purchaser be certified by the manufacturer as conforming to this specification subject to the following procedure. Not less than two tension tests, and two hardness tests, from different heats, and not less than one chemical analysis shall be made by the manufacturer from each day's melt. Records of the tension test results, hardness, and chemical analysis shall be systematically made and maintained and shall be the basis for certification. In lieu of the manufacturer's certification and upon written request by the purchaser, these records may be examined on the manufacturer's premises by the purchaser or his accredited representative.

14. Keywords

14.1 bronze castings; copper-base castings; gear castings; gear bronze