



Designation: B427-02 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 specification~~

~~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. ~~Metrie~~^{SI} values given in parentheses are for information purposes only.

2. Referenced Documents

~~2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:~~

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

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

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.

Current edition approved Dec. 10, 2002; Oct. 1, 2009. Published February 2003; November 2009. Originally approved in 1965. Discontinued June 2002 and reinstated as B427 – 02. Last previous edition approved in 1993 as B427 – 93a. B427 – 02. DOI: 10.1520/B0427-029.

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 Vol 02.01, 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

3.1.1 Quantity of castings required;

3.1.2 Copper Alloy UNS No. (

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),

3.1.3 Specification title, number, and year of issue,

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

3.1.5 Repair of castings (Section 7

5.1.5 Repair of castings (Section 9),

3.1.6 Certification, if specified in the purchase order (Specification B824);

3.1.7 Foundry test report, if specified in the purchase order (Specification

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

3.1.8 Witness inspection; 5.1.7 Foundry test report, if specified in the purchase order (Specification B824);

3.2 When material is purchased for agencies of the U.S. Government, the Supplementary Requirements of Specification), 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.

4.

6. Chemical Composition

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

4.2 These 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 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.

5.7. Mechanical Property Requirements

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

6. Dimensions, Weights, and Permissible Variations

6.1 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.

TABLE 2 Chemical Requirements

Element	Composition, max % (Unless Shown as a Range or Minimum) Copper Alloy UNS No.				
	C90800 ^A	C91700 ^A	C90700 ^A	C91600 ^A	C92900 ^A
Copper	remainder	remainder	remainder	remainder	remainder
Copper	85.0–89.0 ^B	84.0–87.0 ^B	88.0–90.0 ^B	86.0–89.0 ^B	82.0–86.0 ^B
Tin	11.0–13.0	11.3–12.5	10.0–12.0	9.7–10.8	9.0–11.0
Lead	0.25	0.25	0.50	0.25	2.0–3.2
Zinc	0.25	0.25	0.50	0.25	0.25
Iron	0.15	0.20	0.15	0.20	0.20
Antimony	0.20	0.20	0.20	0.20	0.25
Nickel	0.50	1.2–2.0	0.50	1.2–2.0	2.8–4.0
Nickel (incl. cobalt)	0.50	1.2–2.0	0.50	1.2–2.0	2.8–4.0
Sulfur	0.05	0.05	0.05	0.05	0.05
Phosphorus	0.30	0.30	0.30	0.30	0.50
Aluminum	0.005	0.005	0.005	0.005	0.005
Silicon	0.005	0.005	0.005	0.005	0.005

^A Ingot for remelting specifications vary from the ranges shown.

^B In determining Cu min., Cu may be calculated as Cu + Ni.