Designation: B61 – 15

Standard Specification for Steam or Valve Bronze Castings[1]

This standard is issued under the fixed designation B61; 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[2] establishes requirements for a high-grade steam-metal or valve-bronze alloy (Copper Alloy UNS No. C92200[3]) used for component castings of valves, flanges, and fittings.

1.2 The castings covered are used in products that may be manufactured in advance and supplied from stock by the manufacturer or other dealer.

1.3 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.

2. Referenced Documents

2.1 *ASTM Standards:*[4]

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

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

2.2 *MSS Standards:*[5]

SP-25 Standard Marking System for Valves, Fittings, Flanges and Unions

3. General Requirements

3.1 The following sections of Specification B824 form a part of this specification. In the event of a conflict between this specification and Specification B824, the requirements of this specification shall take precedence.

3.1.1 Terminology (Section 3),
3.1.2 Other Requirements (Section 7),
3.1.3 Dimensions, Mass, and Permissible Variations (Section 8),
3.1.4 Workmanship, Finish, and Appearance (Section 9),
3.1.5 Sampling (Section 10),
3.1.6 Number of Tests and Retests (Section 11),
3.1.7 Specimen Preparation (Section 12),
3.1.8 Test Methods (Section 13),
3.1.9 Significance of Numerical Limits (Section 14),
3.1.10 Inspection (Section 15),
3.1.11 Rejection and Rehearing (Section 16),
3.1.12 Certification (Section 17),
3.1.13 Test Report (Section 18),
3.1.14 Product Marking (Section 19), and
3.1.15 Packaging and Package Marking (Section 20).

4. Terminology

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

5. Ordering Information

5.1 Include the following information when placing orders for castings 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 condition (as-cast, machined),
5.1.5 Pressure test requirements, if specified in the purchase order (Specification B824),
5.1.6 Soundness requirements, if specified in the purchase order (Specification B824),
5.1.7 Certification, if specified in the purchase order (Specification B824),
5.1.8 Foundry test report, if specified in the purchase order (Specification B824),

[1] This practice 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 May 1, 2015. Published May 2015. Originally approved in 1927. Last previous edition approved in 2013 as B61 – 08(2013). DOI: 10.1520/B0061-15.

[2] For *ASME Boiler and Pressure Vessel Code* applications see related Specification SB-61 of that Code.

[3] 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.

[4] 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.

[5] Available from Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, 127 Park St., NE, Vienna, VA 22180-4602, http://www.msshq.org.

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

TABLE 1 Chemical Requirements, Copper Alloy UNS No. C92200

Elements	Composition, % max (Except as indicated)
Copper	86.0–90.0
Tin	5.5–6.5
Lead	1.0–2.0
Zinc	3.0–5.0
Nickel including Cobalt	1.0[A]
Iron	0.25
Antimony	0.25
Sulfur	0.05
Phosphorus[B]	0.05
Aluminum	0.005
Silicon	0.005

[A] In determining copper minimum, copper may be calculated as copper plus nickel.
[B] For continuous castings, phosphorus shall be 1.5 % max.

5.1.9 Witness inspection, if specified in the purchase order (Specification B824),

5.1.10 ASME boiler and pressure vessel application (Section 10), and

5.1.11 Product marking, if specified in the purchase order (Specification B824 and Section 11).

5.2 When material is purchased for agencies of the U.S. Government, specify the Supplementary Requirements in Specification B824.

6. Chemical Composition

6.1 The alloy shall conform to the chemical requirements specified in Table 1.

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 as follows:

$$\text{Copper plus named elements, } 99.3\,\% \text{ minimum.} \quad (1)$$

7. Mechanical Property Requirements

7.1 Mechanical properties shall be determined from separately cast test bars and shall meet the requirements shown in Table 2.

8. Casting Repair

8.1 Castings shall not be plugged, welded, burned-in, or impregnated.

9. Sampling

9.1 Copper Alloy UNS No. C92200 test bar castings shall be cast to the form and dimensions shown in Figs. 2, 3, or 4 of Practice B208.

10. Certification

10.1 When material is specified to meet the requirements of *ASME Boiler and Pressure Vessel Code*, the certification requirements of Specification B824 are mandatory.

11. Product Marking

11.1 Valves, flanges, and fittings shall be marked in accordance with the latest revision of the Standard Marking System for Valves, Fittings, Flanges, and Unions (No. SP-25) of the Manufacturers Standardization Society of the Valve and Fittings Industry, and in such position as not to injure the usefulness of the casting.

12. Keywords

12.1 Copper Alloy UNS No. C92200 valves; fittings; flanges; Navy M castings; steam bronze castings; valve castings; valve bronze

TABLE 2 Tensile Properties

Tensile strength, min, ksi[A] (MPa[B])	34 (235)
Yield strength,[C] min, ksi[A] (MPa[B])	16 (110)
Elongation in 2 in. (50.8 mm), min %	24

[A] ksi = 1000 psi.
[B] See Appendix.
[C] Yield strength shall be determined as the stress producing an elongation under load of 0.5 % that is, 0.01 in. (0.25 mm) in a gage length of 2 in. (51 mm).

APPENDIX

(Nonmandatory Information)

X1. METRIC EQUIVALENTS

X1.1 The SI unit for strength properties now shown is in accordance with the International System of Units (SI). The derived SI unit for force is the newton (N), which is defined as that force which when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared ($N = kg{\cdot}m/s^2$). The derived SI unit for pressure or stress is the newton per square metre (N/m^2), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since 1 ksi = 6 894 757 Pa the metric equivalents are expressed as megapascal (MPa), which is the same as MN/m^2 and N/mm^2.

SUMMARY OF CHANGES

Committee B05 has identified the location of selected changes to this standard since the last issue (B61–08(2013)) that may impact the use of this standard. (Approved May 1, 2015.)

(1) Table 1 was revised.

(2) Sections 5.1.5 and 6.3 were deleted.