



## Designation: B61 – 15 (Reapproved 2021)

# Standard Specification for Steam or Valve Bronze Castings<sup>1</sup>

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 ( $\epsilon$ ) 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<sup>2</sup> establishes requirements for a high-grade steam-metal or valve-bronze alloy (Copper Alloy UNS No. C92200<sup>3</sup>) 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.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>4</sup>

[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 *ASME Code*:<sup>5</sup>

[ASME Boiler and Pressure Vessel Code](#)

2.3 *MSS Standard*:<sup>6</sup>

[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:

<sup>5</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

<sup>6</sup> 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

- 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**),
- 5.1.9 Witness inspection, if specified in the purchase order (**Specification B824**),
- 5.1.10 *ASME Boiler and Pressure Vessel Code* 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

**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 <sup>A</sup>
Iron	0.25
Antimony	0.25
Sulfur	0.05
Phosphorus <sup>B</sup>	0.05
Aluminum	0.005
Silicon	0.005

<sup>A</sup> In determining copper minimum, copper may be calculated as copper plus nickel.  
<sup>B</sup> For continuous castings, phosphorus shall be 1.5 % max.

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:

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

**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 <sup>A</sup> (MPa <sup>B</sup> )	34 (235)
Yield strength, <sup>C</sup> min, ksi <sup>A</sup> (MPa <sup>B</sup> )	16 (110)
Elongation in 2 in. (50.8 mm), min %	24

<sup>A</sup> ksi = 1000 psi.  
<sup>B</sup> See Appendix.  
<sup>C</sup> 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).